NASA SP-7011(44)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during November 1967

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. DECEMBER 1967

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INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

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b. AIAA entries identified by their *IAA* accession numbers (A67-10000 series); and
c. LC entries identified by a number in the A67-80000 series.

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(continued)

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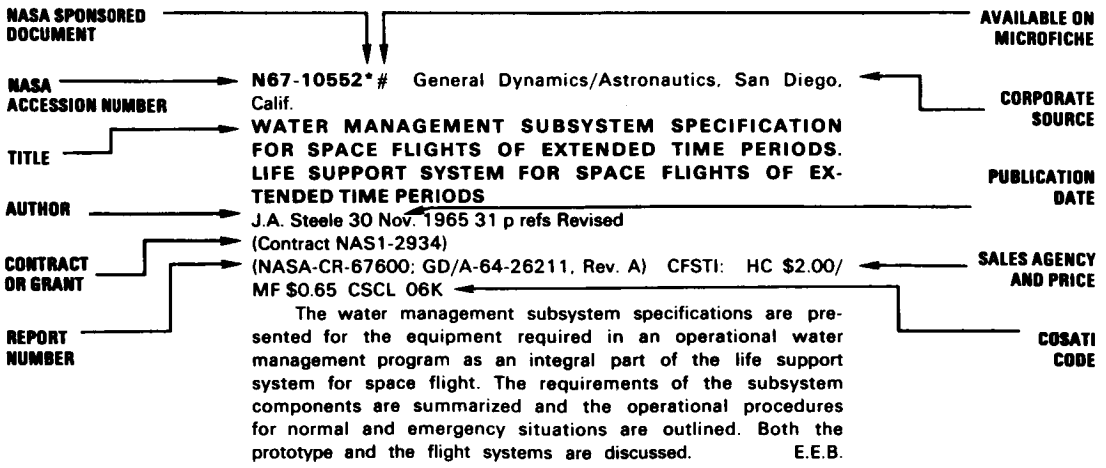
TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography DECEMBER 1967

STAR ENTRIES

N67-35308*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BIOTECHNOLOGY
Paul Foster *In its* Aerospace Related Technol. Conf. for Ind. and Com. 25 May 1967 p 69–85 (See N67-35303 21-15)

Examples of space medical equipment, already being applied on earth, are described. The convenience of spray-on electrodes, for monitoring heart action, to the patient and to the nurse is indicated. Piezoelectric devices for sensing vibrations are applied to the detection of heart beats in chick embryos, muscle tremors, and cranial accelerations. Thermocouples were developed to determine temperature conditions in the brain during cryogenic surgery. A walking chair, design as a lunar walker, is being tested by crippled children. An infrared sensor operated by eye movement is under consideration as control switches for paralyzed persons. An artificial heart system and a photographic technique to bring out fine detail on X-ray pictures are also described. N.E.N.

N67-35314# Bucknell Univ., Lewisburg, Pa.
FEAR OF FAILURE AND AUTONOMIC RESPONSIVITY IN ACHIEVEMENT SITUATIONS
Robert I. Fischer and Richard C. Teevan 1967 30 p refs
(Contract Nonr-3591(01))
(TR-24; AD-654475)

Nineteen Ss were operationally defined as high fear of failure (FF) and 19 Ss as low FF on the basis of the Hostile Press scoring system of the TAT (Birney, Burdick, + Teevan, 1964). Their heart rates were measured in individual testing sessions designed to create a stressful situation in which the stress was related to achievement motivation. It was hypothesized that since high FF individuals defend against the perception of their own failure by projecting their inadequacies onto the environment, they would react to stress with patterns of autonomic responsivity similar to those of Anger-out individuals (as defined by Funkenstein, King, + Drolette, 1957). The results showed that there were no mean differences between the high and low FF groups in terms of their autonomic responsivity to stress although the high FF group was significantly more variable in heart rate levels than the low FF group. The results were interpreted in terms of the possible defensive postures available to the high FF individual in achievement situations. Author (TAB)

N67-35365 Joint Publications Research Service, Washington, D. C.
PNEUMATIC INSULATION SUIT FOR RADIOACTIVITY PROTECTION
S. M. Gorodinskiy and V. L. Shcherbakov 13 Jul. 1967 7 p Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 5, 1967 p 43–46
(JPRS-41816; TT-67-32448) CFSTI: $3.00

A pneumatically insulated suit with its own system for regenerating air was developed for use under radioactive conditions. The suit, which has a hose to an air supply, is considered 99.9% effective against gases and aerosols. It has minimum dimensions, can be used for a two-hour period in temperatures up to 40° and 45°C, and is easily decontaminated. A cooling suit of bleached moleskin is worn over the insulation suit, which is made of freezeproof polyvinyl chloride plastic reinforced with capron mesh. In effect, the inside of the suit is used as a breathing bag; and no loss of consciousness has been observed in persons wearing the suit. M.W.R.

N67-35374* General Electric Co., Philadelphia, Pa. Missile and Space Div.
BIOSATELLITE ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM DESIGN
Robert Ebersole, Louis Pochettino, and Walter Kugler [1967] 40 p
(Contract NAS2-1900)
(NASA-CR-73116) CSCL 06K

This paper presents the environmental control and life support system design for the 21 and 30 day mission NASA Biosatellite Program. The biosatellite missions will be flown to investigate the following: (1) twenty-one days for growth and morphological studies, and for metabolic biorhythms; and (2) thirty days for studies of nervous function, behavior, metabolism and cardiovascular function of the primate. Temperature control is provided by a circulating coolant loop which utilizes a 24 ft^2 radiator, liquid-to-liquid and air-to-liquid heat exchangers, temperature control mechanical and electrical valves, and water boiler for peak thermal conditions. A two loop system is described which provides temperature control for the fuel cell power source, cryogenic gases, water and urine storage and the gas management system. The gas management system which provides control of the gaseous environment in the recovery capsule is also described. This system controls temperature, relative humidity, re-circulation and filtration of the atmosphere, build-up of toxic and/or nontoxic gases and odors, and partial and total pressure of the nitrogen/oxygen atmosphere. Comparisons of the experimental results with analytical predictions are presented. Extensive thermal vacuum system testing was performed to verify design predictions. Good agreement with analysis was achieved. Author

N67-35420# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE ROLE OF A MOTOR LINK IN THE VISUAL SYSTEM IN OBJECT IDENTIFICATION BY ITS OUTWARD CONTOUR [O ROLI MOTORNOGO ZVENA ZRITEL'NOY SISTEMY PRI OPOZNANII OB'YEKTA PO VNESHNEMU KONTURU]

R. M. Granovskaya and V. A. Ganzen 20 Jan. 1967 28 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 1 1965 p 66-81

(FTD-TT-65-1743; TT-67-62294; AD-655051)

The article deals with the proposed methods for solving the problem of identifying visual images. Motor mechanisms of the visual system are discussed. By proceeding from recognition of the role played by the motor link in the process of identifying contour images, the authors intended to design and check a theoretical model of a system that performs this process. Experiments are described and the model is discussed. TAB

N67-35433# General Electric Co., Philadelphia, Pa. Missile and Space Div.

APPLICATION OF PERMSELECTIVE COMPOSITE TECHNIQUES FOR ATMOSPHERE-THERMAL CONTROL OF EMERGENCY AND EXTRAVEHICULAR MANNED SPACE ASSEMBLIES Final Report, May 1965–Aug. 1966

David J. Withey, Edward J. Glanfield, and Clark V. Dohner Wright-Patterson AFB, Ohio, AMRL, Apr. 1967 92 p refs

(Contract AF 33(615)-2850)

(AMRL-TR-66-224; AD-655089)

The program encompasses the analysis, research, design fabrication, and testing of an exploratory laboratory model of an emergency or extravehicular space assembly using permselective membrane techniques for atmosphere control. The purpose of this effort was to develop an advanced concept which would depart from the traditional approach utilized in spacecraft design by transferring most of the atmosphere-thermal control functions from the associated hardware subsystems to the enclosing structure. A silicon rubber permselective composite incorporated into the pressure retention wall of the enclosing structure permits selective permeation of carbon dioxide, water vapor, and contaminant gases to space with minimal oxygen permeation. In addition, the use of superinsulation on the exterior surface of the structure provides passive radiant thermal control. This, in conjunction with the permselective composite material, substantially reduces the weight, volume, and power requirements of environmental control subsystems required for a manned emergency and extravehicular assembly. While the permselectivity of the silicone rubber composite was determined, the final structure was subject to a large amount of leakage. This resulted in the cancellation of the full scale test program and in redirection of the project effort to include a failure analysis to determine the cause and solution to the leakage problem. Author (TAB)

N67-35434# Innsbruck Univ. (Austria).

STUDIES OF ARTIFICIALLY DISTURBED SENSORY COORDINATION IN MAN Final Scientific Report, 1 Mar. 1966–28 Feb. 1967

Franz Thurner 10 May 1967 143 p refs

(Contract AF 61(052)-938)

(AFOSR-67-1548; AD-655128)

Contents: The problem of incongruence--the S-Illusion; The processing of simultaneous visual and kinesthetic signals of directional movement; Comparison of successive visual and kinesthetic signals; Directional judgments with a visual standard and a kinesthetic comparison object; Increasing suppression of kinesthetic signals by training; Kinesthetic comparison of movement directions; On the dominance of vision over kinesthesis; The adjustment of motor behavior to displaced vision; Differences between displacements and other sources of variance; Performance under different visual feedback conditions; Differences between movement directions and the effect of training; Differences between directions of movement; Rule-learning versus specific learning; Task performance under visual displacement and the problem of abilities. TAB

N67-35468# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

CONTROL OF A REMOTE MANEUVERING UNIT DURING SATELLITE INSPECTION

Herbert J. Clark Mar. 1967 23 p refs

(AMRL-TR-66-134; AD-654327)

Operator performance in flying a simulated remote maneuvering unit (RMU) on a coplanar satellite inspection mission was evaluated under two conditions of RMU attitude control and two conditions of cockpit instrumentation. The maneuver was repeatedly performed successfully using either an on-off acceleration-command attitude control system or an on-off rate-command attitude control system, each with either a full panel of cockpit instruments (six) or only one cockpit instrument. The rate-command system was found to be superior for pitch control during station keeping and for roll control in general. The acceleration-command system was superior for pitch control during the trajectory portions of the mission. Because both control systems had disadvantages, consideration of a variable rate-control system is recommended. More economical and precise RMU control was obtained under the full-panel cockpit instrumentation condition irrespective of the control system used. The instruments of most value were found to be those which provided X (longitudinal) and Z (vertical) distance information. The limitations of the simulation and the advantages and disadvantages of an inside-out versus an outside-in television display of the target and its surrounds are also discussed. Author (TAB)

N67-35479# Pennsylvania Univ., Philadelphia. Electromedical Div.

THE MEASUREMENT OF THE COMPLEX DIELECTRIC CONSTANT OF PROTEIN SOLUTIONS AT ULTRAHIGH FREQUENCIES: DIELECTRIC PROPERTIES OF HEMOGLOBIN BOUND WATER

Bernard E. Pennock (Ph.D. Thesis) [1967] 368 p refs

(Contract Nonr-551(52); Grants NIH T01-GM-00606; NIH HE-01253)

(Rept.-68-01 ONR-TR-14; AD-655127)

A report is given of work undertaken to relate the measured values of the complex dielectric constant of the globular protein, hemoglobin, in solution, to certain structural features of the hemoglobin molecule (namely water bound to the surface and polar side chains extending out from the surface). Author (TAB)

N67-35537# Zaret Foundation, Inc., Scarsdale, N. Y.

OPHTHALMIC HAZARDS OF MICROWAVE AND LASER ENVIRONMENTS Annual Progress Report, 1 Jun. 1966–31 May 1967

Milton M. Zaret 31 May 1967 12 p

(Contract DA-49-193-MD-2592)

(AD-654523) CFSTI: HC $3.00/MF $0.65

The purpose of this investigation is to determine the nature and scope of radiation hazards and to recommend the requisite parameters for health-safety. For both microwave and laser radiation, ophthalmic pathology is the most sensitive indicator of injury. Threshold changes are produced in the lens with microwave radiation and in the retina with laser radiation. As the threshold lesions are not obvious in routine ophthalmic examination, special techniques are under development not only to permit discovery of the earliest occurrence of the injury but also to document the findings. Author (TAB)

N67-35543# Air Force Academy, Colo. Frank J. Seiler Research Lab.

THE HUMAN EYE-MOVEMENT MECHANISM: EXPERIMENTS, MODELING AND MODEL TESTING Final Report Report

Gerald Cook and Lawrence Stark (Ill. Univ., Chicago) Jun. 1967 29 p refs

(SRL-67-0005; AD-654626)

A model for the human eye-positioning mechanism is presented. The derivation of the model is outlined briefly. Experiments for obtaining actual eye-movement behavior are described. Model simulations and comparisons of these results with experimental results are presented. The comparisons support the validity of the model. The physical basis of the model adds meaning to the model and insight into the operation of the actual system. Author (TAB)

N67-35550# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

AN EXPERIMENTAL ELECTRONIC STETHOSCOPE FOR AIRCRAFT USE Preliminary Report, 6 Jan.–23 Aug. 1966

Francis A. Brogan, Frederick G. Collins, and Morgan E. Wing May 1967 15 p ref

(SAM-TR-67-39; AD-655060)

An experimental electronic stethoscope for use aboard aeromedical evacuation flights and on flight lines was developed. Preliminary evaluation has indicated that such an instrument is both feasible and useful aboard aeromedical-evacuation aircraft and in patient staging areas on the flight line. Utilization of a noise-shielded pickup and earphones mounted in a noise-protection earmuff, plus the use of appropriate filter circuits, substantially excludes environmental noise while enhancing the audibility of desired sounds. Author (TAB)

N67-35585# Bunker-Ramo Corp., Canoga Park, Calif.

EFFECTS OF COCKPIT LIGHTING COLOR ON DARK ADAPTATION Final Report, Apr. 1966–Jan. 1967

Hugh A. Smith and Constance Goddard Wright-Patterson AFB, Ohio, AF Flight Dyn. Lab., May 1967 83 p refs

(Contract AF 33(615)-5225)

(AFFDL-TR-67-56; AD-654652)

The report is addressed to the general problem area of the effects of color of illumination on early dark adaptation. An analysis of the relevant published literature is presented as it relates to the relative benefits of red cockpit lighting as opposed to white or other colors for night flying. A report of a demonstration which compared the effects of green and white lighting to red lighting on subsequent early dark adaptation is included. An annotated bibliography of the literature reviewed for the report is also presented. A systems approach to cockpit illumination is stressed. Author (TAB)

N67-35603# George Washington Univ., Alexandria, Va. Human Resources Research Office.

WEBER'S LAW APPLIED TO DISTANCE ESTIMATION

R. E. Wienke Jun. 1967 11 p refs Presented at the Southwestern Psychological Assoc., Houston, Tex., Apr. 1967

(Contract DA-44-188-ARO-2)

(HUMRRO-PP-26-67; AD-654346)

The stimulus situation in dynamic range estimation is examined. The solid angle, taking into account the area of the target as well as the distance, is used as the visual concept, and the prediction made that range estimation would follow Webers Law. The results support the hypothesis that absolute errors in range estimation are an inverse function of the acceleration of the increase in size of the solid angle representing the target. The study suggests that one problem in research dealing with dynamic range estimation is that the results to be expected are highly dependent on the experimental conditions. Author (TAB)

N67-35613*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A REVIEW OF SOME EXPERIMENTS ON THE SYNTHESIS OF "JEEWANU"

Linda D. Caren and Cyril Ponnamperuma Washington, NASA, Sep. 1967 8 p refs

(NASA-TM-X-1439) CFSTI: HC $3.00/MF $0.65 CSCL 06C

A critical assessment is presented on the data from experiments conducted to synthesize inorganic and organic living globules, called jeewanu. One organic group was produced photochemically; the other was prepared from thermal polymers of amino acids. Although the properties attributed to the jeewanu include growth, multiplication, and metabolic activity, it was concluded that objective, definitive experiments were not performed, and that insufficient evidence was advanced to prove that jeewanu are alive. M.G.J.

N67-35643# American Inst. for Research, Washington, D. C.

STUDIES OF COMPONENT-TOTAL TASK RELATIONS: ORDER OF COMPONENT-TOTAL TASK PRACTICE AND TOTAL TASK PREDICTABILITY

Roy Omer Freedle, Albert Zavala, and Edwin A. Fleishman Mar. 1967 51 p refs

(Contract DA-49-193-MD-2632)

(AIR-E-29-3/67-TR-1; R67-4; TR-1; AD-654512)

The purpose of this study was to examine the relationships between performance on a complex (total) task and the performance on various components of that task when the latter are practiced in different orders. The total task (The Complex Coordinator) was represented as a composite of single-level and/or double-level task components. When the order in which the various tasks was ignored, 31.6% of the total task variance could be accounted for by the component task scores, but when order of practice was taken into account total task variance accounted for varied from 32.5% up to 70.6% depending on which particular double-level and single-level tasks were combined to predict total task scores. Thus order of practice on part tasks (component tasks) with respect to the total task makes a difference in predicting total task proficiency. More specifically, observed and predicted total task scores agree better when double-level components are practiced before the total task than when they are practiced after the total task. Also, total task proficiency is significantly improved by prior practice on double-level tasks. Prior practice on single-level tasks did not lead to significant total task improvement. Author (TAB)

N67-35654# Michigan Univ., Ann Arbor. Sensory Intelligence Lab.

A PSYCHOPHYSICAL STUDY OF INTERPRETATION OF PHYSIOLOGICAL RECORDINGS Final Technical Report, 1 Apr. 1964–28 Feb. 1966

Wilson P. Tanner, Jr. May 1967 21 p refs

(Contract DA-49-193-MD-2585)

(AD-654441) CFSTI: HC $3.00/MF $0.65

Studies were conducted on the ability of observers to read records of physiological character. The records were constructed of signals added to noise, with both the signal and noise designed to be similar to conditions frequently encountered in physiological recordings. The observer was presented with a trace on an oscilloscope which was generated either by signal plus noise, or by noise alone. He was asked to state whether the trace contained the signal or contained only noise. During the studies he was not permitted to see the signal without the noise. After each decision, the observer was told if he was right or wrong. In the first of two experiments, the signal had no uncertain parameters, while in the second, the signal had a relatively small starting time uncertainty. ROC curves were obtained by changing the bonus payoff schedule for the observer. Under fixed signal conditions, d, the index of detectability, was independent of drastic changes in the observers criterion. In the second experiment, the slight uncertainty in starting time was reflected in a shift of the slope of the ROC curve. The

change in slope was indicative of increased variance in the S + N distribution of events. Author (TAB)

N67-35674# Illinois Univ., Urbana. Group Effectiveness Research Lab.

A CONSIDERATION OF TWO ASSUMPTIONS UNDERLYING FEIDLER'S CONTINGENCY MODEL FOR THE PREDICTION OF LEADERSHIP EFFECTIVENESS

Martin Fishbein, Eva Landy, and Grace Hatch May 1967 32 p refs

(Contract Nonr-1834(36); ARPA Order 454)

(TR-52; AD-655102)

An attempt was made to explore two of the basic assumptions underlying Fiedlers (1964, 1965) Contingency Model: (1) the assumption that different group-task situations require a different leader-group member interaction, i.e., demand different types of leadership behaviors; and (2) the assumption that these demands will covary systematically with the three dimensions of the group-task situation specified by the Contingency Model. One hundred forty-one male undergraduates rated the way they believed the Most Effective Leader (MEL) should perform in each of eight group-task situations on a Behavioral Description Questionnaire. The results indicated that although these ratings of the MELs behavior did vary across the different group-task situations, the ratings were significantly influenced by only two of the three group-task dimensions isolated by Fiedler, namely, the leader-member relations and the position power dimensions. Additional hypotheses related to the Contingency Model were also investigated and discussed. Author (TAB)

N67-35684# Logistics Management Inst., Washington, D. C.

FORECAST OF AIRLINE PILOT REQUIREMENTS

May 1967 55 p refs

(Contract ARPA SD-271)

(AD-654182)

The report presents a forecast of pilot needs by the U.S. certificated route air carriers up to 1980. The forecast of active pilot employment was made in two ways: direct extrapolation of past employment trends; and estimates based on the forecast size and composition of the air carriers aircraft fleet. Forecasts of annual pilot attrition were included to arrive at annual estimates of new pilot demand. Since the long-range trend is of primary interest, short-term variations have not been highlighted. Based on the analyses qualifications detailed in the report, the most probable level of U. S. certificated route air carrier active pilot employment will be around 44,000 in 1977. The total number of new pilot hires during the next ten years is forecast to be around 31,000. TAB

N67-35742# George Washington Univ., Alexandria, Va. Human Resources Research Office.

HUMAN FACTORS RESEARCH IN SUPPORT OF ARMY AVIATION

Francis H. Thomas, Paul W. Caro, Jr., and Wiley R. Boyles Jun. 1967 21 p refs Presented at the 13th Ann. Symp. of the Southeastern Psychological Assoc., Atlanta, Apr. 1967 *Its* Profess. Paper No. 27-67

(Contract DA-44-188-ARO-2)

(AD-655126)

Three papers were presented as part of a symposium concerned with human factors implications in army aviation performance and training. The first paper deals with human factor problems in complex systems, particularly problems encountered in the aerial reconnaissance and surveillance subsystem of the combat intelligence system. The initial concern has been to improve human effectiveness in collecting battle area information through new training methods and techniques, the second paper deals with the effectiveness of the synthetic helicopter flight training devices and their usefulness for transfer of training from a rotary-wing instrument flight qualification course to performance on the actual helicopter. The third paper concerns research on aviator stresses during combat missions. The research objectives were to provide the army with readily usable information to variables that affect aviator performance, and to integrate this information into a system of performance prediction. Author (TAB)

N67-35755 Nuklearni Institut Jozef Stefan, Ljubljana (Yugoslavia).

FAST NUCLEAR MAGNETIC RESONANCE SELECTION METHOD IN PLANT BREEDING FOR HIGHER OIL CONTENT

I. Zupancic, S. Vrscaj, J. Porok, I. Levstek, V. Erzen et al Apr. 1967 8 p refs

(NIJS-R-500)

A new wide line nuclear magnetic resonance (NMR) technique for the fast, selective, and inexpensive determination of oil content in single kernel samples of maize and sunflower seeds is described. In this method the selection decisions are based on the properties of individual kernels and not on population averages, the kernels are neither destroyed nor biologically damaged during the analysis, and a large number of samples can be analyzed in a short period of time. This method also has higher speed and selectivity than the conventional wide line NMR method. The selectivity of the method is based on the different degree of mobility of the various hydrogen containing constituents of plant seeds. R.N.A.

N67-35768*# General American Transportation Corp., Niles, Ill. Research Div.

ADVANCED CONCEPT OF A LABORATORY-TYPE OXYGEN RECLAMATION SYSTEM FOR MANNED SPACECRAFT

A. J. Glueckert and G. A. Remus [1967] 81 p refs

(Contract NAS1-5269)

(NASA-CR-66403) CSCL 06K

Three processes comprising an oxygen reclamation system were investigated: electrolytic reduction of carbon dioxide in a molten carbonate electrolysis cell, oxygen permeation through a heated silver membrane, and catalytic disproportionation of carbon monoxide to carbon and carbon dioxide. The electrolysis cell effectively reduced carbon dioxide giving essentially theoretical yields of oxygen at the operating temperature of 1300°F. The electrolyte was a molten mixture of the carbonates of sodium, lithium and potassium immobilized by magnesium oxide to form a non-flowing matrix. Quantitative reduction of CO_2 could not be related to the power input due to cell body corrosion and electrolyte cross-leakage problems. These same problems prevented fabrication of a fully operational cell; due to a shift in emphasis to fabrication of the catalytic reactor, all of the research planned for this component was not completed. The catalytic reactor effectively disproportionated carbon monoxide to carbon dioxide and carbon. The most effective catalyst was H-219 nickel oxide. Conversion averaged 85% of theoretical with pure CO feed, and 52% with a 1:1 mixture of CO and CO_2. A one-tenth man capacity laboratory model was fabricated and operated continuously for eight days with the 1:1 CO and CO_2 feed mixture. Author

N67-35782# Naval Radiological Defense Lab., San Francisco, Calif.

EFFECTS OF ULTRAVIOLET LIGHT IRRADIATION AND HEAT SHOCKS ON CELL DIVISION IN SYNCHRONIZED TETRAHYMENA

A. C. Giese (Stanford Univ.) and D. Stuart Nachtwey 24 May 1967 28 p refs Prepared jointly with Stanford Univ.

(Grant PHS-C-3461)

(USNRDL-TR-67-58; AD-654715)

The division of synchronized Tetrahymena pyriformis (strain W) irradiated with low doses of ultraviolet light is delayed if the irradiation is administered during the first 30 minutes after the end of the synchronizing treatment. After a short period of transition, division in most cells is not delayed even by relatively high doses. The delay induced by a particular low dose administered at any

time up to the transition to insensitivity is essentially constant. The division of synchronized cells is delayed by heat shocks (34 plus or minus 0.1C, for 20 minutes) applied at any time up to approximately 60 minutes after the end of the synchronizing treatment. After this time, for any single cell in a sample, there is an instantaneous transition to heat-shock insensitivity. The delays in cell division induced by heat shocks increase with time from the end of the synchronizing treatment, attaining a maximum just before the transition to insensitivity. The two different transition times in the responses of synchronized cells to UV and to heat shock are interpreted as representing the completion of two different processes in the final preparation of the cells for division. The qualitative and quantitative differences between the responses to UV and to heat shock suggest that two different substances are involved, one sensitive to UV and one to heat. Some evidence is presented that suggests that the completion of the heat-sensitive process depends upon the UV-sensitive process. Author (TAB)

N67-35845# Atomic Energy Establishment, Winfrith (England). Radiological and Safety Div.

USE OF ULTRASONICS TO INVESTIGATE SOFT TISSUE THICKNESSES ON THE HUMAN CHEST

D. Ramsden, C. O. Peabody, and R. G. Speight Mar. 1967 18 p refs

(AEEW-R-493) CFSTI: HC $3.00/MF $0.65

The measurement of soft tissue thicknesses over the chest of nineteen male subjects using an ultrasonic probe is described. The apparatus and techniques are briefly described. The results are tabulated, and correlations of the mean soft tissue thicknesses with various combinations of body parameters are given. Variations in the distribution and amount of soft tissue between the chests of individuals mean that large corrections must be applied to results obtained from in vivo estimation of ^{239}Pu and ^{241}Am in the human lung. The best correlations obtained enable the mean soft tissue thickness to be predicted to within 0.2 cm (95% confidence limit) from a knowledge of the individuals weight, height and chest circumference. The corresponding error in an estimation of ^{239}Pu in the lung would be ±20%. NSA

N67-35872*# Dunlap and Associates, Inc., Santa Monica, Calif.

HUMAN OPERATOR RESPONSE SPEED, FREQUENCY, AND FLEXIBILITY: A REVIEW, ANALYSIS AND DEVICE DEMONSTRATION

M. J. Wargo, C. R. Kelley, M. B. Mitchell, and D. J. Proisin Washington, NASA, Sep. 1967 80 p refs

(Contract NAS12-103)

(NASA-CR-874) CFSTI: HC $3.00/MF $0.65 CSCL 05H

A muscle action potential control, simultaneous visual-auditory display device was developed to demonstrate the increase in operator response speed, frequency and flexibility that can accrue from advanced manual control techniques. In a discrete control situation, muscle action potential control was found to increase response speed by approximately 100 ms and simultaneous visual-auditory display was found to reduce response time by an additional 40 ms. In a continuous control situation, muscle action potential control via the facial muscles increased operator response bandwidth across a range of forcing function amplitudes. Author

N67-35873# New York Research Group, Inc., N. Y.

A MATHEMATICAL MODEL FOR THE PERCEPTION OF TONES IN CONTEXT (II) Final Report, 16 May 1966–15 May 1967

David Rothenberg May 1967 51 p refs

(Contract AF 49(638)-1738)

(TR-II; AFOSR-67-1489; AD-655117)

A mathematical model was applied to the perception of stimuli which carry information, e.g. phonemes of spoken language, Morse Code signals, musical tones and rhythms. This report is restricted to that version of the model which applies to perception of tones in a musical context. (See also AD-647 270). The model described proposes a method by which a listener differentiates and classifies the great number of different stimuli provided by music, such as musical intervals, durations, or timbres, using only a small number of learned classifiers. Such classifiers are orderings of stimuli and are extracted from the contexts in which the stimuli appear. It is postulated that these orderings rather than any fixed magnitudes are learned and remembered. Bounds on the structure of these classifiers and those distortions of perception which characterize the use of each are deduced. The relationship is developed between the structure of each of these classifiers and its potential usefulness in transmitting information. A Gestalt description of perception results in which extremely complex and varied phenomena can be perceived without proportionately large human memory. The decoding of information carried by stimuli within such Gestalt contexts is implicit in the model. Author (TAB)

N67-35903# Defence Research Board, Ottawa (Ontario).

CONTENT OF AMINO-ACIDS IN THE DIFFERENT AREAS OF THE BRAIN UNDER CONDITIONS OF HYPEROXIA

T. N. Pogorelova May 1967 5 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 167, no. 6, 1966 p 1421–1422

(T-483-R) CFSTI: HC $3.00/MF $0.65

The content of free amino-acids in the different areas of the brain was investigated in rabbits during the pre-paroxysmal and paroxysmal phases of the effect of oxygen under pressure. In rabbits exposed to oxygen at 6 atm pressure the paroxysms began within 12 to 18 minutes. The amino-acid composition of brain areas was studied by a combined electrophoretic and chromatographic method. In the hemispheres and the thalamus the total content of amino-acids was higher than in other areas of the brain. The various amino acids present in the brain during hyperoxia are tabulated. S.P.

N67-35921*# National Aeronautics and Space Administration, Washington, D. C.

INFLUENCE OF FREQUENCY, NUMBER, AND LOCUS OF STIMULI ON THE INTENSITY DEPENDENCE OF VIBRATORY EVOKED CORTICAL RESPONSE IN MAN

H. Fruhstorfer Aug. 1967 60 p refs Transl. into ENGLISH of the book "Der Einfluss von Reizfolgefrequenz, Reizanzahl, und Reizort auf die Intensitaetsabhaengigkeit Vibratorisch Ausgeloester Corticaler Antworten Beim Menschen" Erlangen. Univ., (W. Germany), 1966 92 p

(NASA-TT-F-11193) CSCL 06P

The variables influencing the relation between stimulus and averaged cortical response, such as adaptation, fatigue, and habituation, are discussed. The area of the potential waves is investigated, indicating that this represents a criterion for the ion shift during the synchronized data processing of a cerebral functional unit. The discontinuity of the intensity function of cortical response to vibratory stimuli of the fingertips, located about 40 db above the threshold of sensitivity, is interpreted as a proof for the existence of two receptor populations of differing sensitivity. It is found that the latency is not so much a function of the number of neurons passed but a manifestation of data processing of differing duration The vibratory evoked potentials decreased with increasing frequency of stimulus application, differing from findings for other sensory systems. Author

N67-35989* Oregon State Univ., Corvallis.

AMMONIFYING, NITRIFYING, AND SULFUR OXIDIZING CAPACITY OF CHILE DESERT SOILS Progress Report

W. B. Bollen and Fred Au 31 May 1967 12 p refs Prepared for JPL

(Contracts NAS7-100; JPL-950983)

(NASA-CR-88021) CSCL 06M

Methods are described and results given for a soil fertilization program based on microbial activity in releasing plant nutrients in desert soils. Most of the arable soil samples studied displayed at least 50% ammonification. One of the soils gave 73% nitrification. Within limits of experimental error, other soils showed no nitrification. This lack is attributed not only to salinity but also to pH values above the threshold value for nitrite formation in soils. All of the soil samples investigated are low in sulfur oxidizing capacity. Data tables presented on Chile desert soil properties include: detritus, moisture, and water-holding capacities; and summaries of ammonification, nitrification, and sulfur oxidation capacities. E.C.

N67-36006# Philco Corp., Willow Grove, Pa. Biomedical Engineering Lab.
MYOPOTENTIAL PATTERNS AND EXTERNAL CONTROL: EFFECTS OF PRACTICE AND FATIGUE, AUGUST 1, 1965–JULY 31, 1966
Roy W. Wirta, Kevin A. Cody, and Ray F. Finley 31 May 1967 38 p ref
(Contract Nonr-4292(00))
(AD-655140)

A motor performance test was devised to ascertain myoelectric response associated with practice and fatigue effect. Five subjects participated in the study over a period of three weeks during which practice and test sessions were uniformly spaced. Using performance times as a criterion measure of proficiency, associated myoelectric data were correlated to determine total electrical energy output and synergic pattern relationships. Results revealed individual responses, but in general, also revealed an increase in total electrical energy output when performance times were significantly reduced. Except during post-fatigue tests, there was no absolutely repeatable pattern (relative ranking by amplitudes) of the multiple contracting muscles. Author (TAB)

N67-36016# Melbourne Univ., Parkville (Australia).
DYNAMICS OF A ROLE THEORY FOR THE WORKER'S JUDGEMENT
Richard C. S. Trahair Jul. 1967 46 p refs
(Contract Nonr-2296(02))
(TR-18; AD-654894)

Specific illustrations are presented to show that the worker seeks a degree of control over the physical demands and intrinsic satisfaction of task performance; authority, pay and security of positions; task competence and the mateship relation of persons. The extent to which the worker seeks control over additional benefits and promotion features of positions is limited by the kind of benefit under consideration, and the success ideology which characterize the lives of men at the lower levels of industrial administration. TAB

N67-36045# Air Force Systems Command, Brooks AFB, Tex. Arctic Aeromedical Lab.
THE COMBINED EFFECTS OF COLD AND EXERCISE ON THE TRICEPS SURAE REFLEX
Jack H. Petajam and Charles J. Eagan May 1967 20 p refs
(AAL-TR-66-15; AD-655069)

The one-half relaxation time (1/2 RT) for the triceps surae reflex was studied in four subjects after five-minute runs at 134 m/min (5 mi/hr) on a treadmill set at 10% grade. This exercise decreased 1/2 RT to 90% of normal. Cooling by immersion to the neck for 60 min in a stirred 30C bath enhanced the exercise effect on 1/2 RT (decreased it to 87%) whereas cooling alone lengthens the relaxation phase. Eight highly-fit athletes (U. S. Biathlon Team) who exercised at the higher level of 5 min at 188 m/min (7 mi/hr) and 8.6% grade, showed a greater effect on 1/2 RT: a decrease to 83% of the pre-exercise value. The shortening of relaxation time by exercise appears to be a warm-up phenomenon related to local metabolic changes in muscle which, paradoxically, are enhanced by whole-body cooling. Author (TAB)

N67-36086# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF MENTAL EXERCISE ON PAROTID FLOW RATE IN THE HUMAN
Ira L. Shannon Apr. 1967 12 p refs
(SAM-TR-67-36; AD-654293)

Three experiments were carried out in which paired parotid fluid samples were collected from 225 healthy young adults in an effort to ascertain the effect of mental exercise on rate of flow. Samples were collected without exogenous stimulation and with paraffin and sugared chewing gum employed as eliciting agents. Mental exertion involved adding columns of whole numbers four digits wide and four digits in height. Subjects were sampled that performed no arithmetic computations, others that solved problems during the second collection interval, while others performed the computations while providing the initial sample. There was no indication in any of the 3 experiments that mental concentration produced a significant effect on the rate of parotid flow.
Author (TAB)

N67-36123*# National Aeronautics and Space Administration, Washington, D. C.
STUDY OF THE CUMULATIVE EFFECT OF IMPACT ACCELERATIONS [ISSLEDOVANIYE KUMULYATIVNOGO DEYSTVIYA UDARNYKH PEREGRUZOK]
S. A. Gozulov, N. P. Morozova, and V. A. Elivanov Aug. 1967 7 p refs Transl. into ENGLISH from Kosmich. Biol. i Med. (USSR), v. 1, no. 2, 1967 p 22–26
(NASA-TT-F-11134) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Experiments on rats were performed to study the cumulative effect of impact accelerations of 600 g revealed at postmortem examinations. The accelerations were applied at different intervals and subcritical landing velocities. The cumulative lesions resulting from repeated exposures with an hour interval were detected as the primary lesion of the lungs similarly to the effect of a single exposure at supercritical velocities. Lesions developed after a comparatively small number of repeated exposures (3 to 5) for a wide range of subcritical velocities (7 to 4–5 m/sec). The aftereffect period covers over 24 hours and is related to reactive changes in individual organs. Author

N67-36129# Joint Publications Research Service, Washington, D. C.
SIMULATION IN BIOLOGY AND MEDICINE
V. M. Glushkov, ed. et al 3 Aug. 1967 44 p refs Transl. into ENGLISH of the book "Modelirovaniye v Biologii i Meditsine" Kiev, Nauk.-Dumka, no. 2, 1966 p 6–40, 75
(JPRS-42066; TT-67-32696) CFSTI: HC $3.00/MF $0.65

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N67-36130# Joint Publications Research Service, Washington, D. C.
POSSIBILITIES AND PROSPECTS OF SIMULATION OF MENTAL FUNCTIONS

N. M. Amosov *In its* Simulation in Biol. and Med., 3 Aug. 1967 p 1–7 (See N67-36129 21-04)

In a study of mental functions, the human brain is likened to a computer. The definition of simulation is given as any cognitive process, and a model is defined as any structure in which the information about the structure and function of another system is reflected. Computer programming and information processing for the cortex are discussed. It is suggested that the creation of an artificial brain must be constructed on other principles, in cooperation with psychologists, physiologists, and mathematicians. R.Ll.

N67-36131# Joint Publications Research Service, Washington, D. C.

THE MEMORY PROBLEM IN NEUROPHYSIOLOGICAL AND BIOCYBERNETIC ASPECTS

K. A. Ivanov-Muromskiy and E. T. Golovan *In its* Simulation in Biol. and Med., 3 Aug. 1967 p 8–13 refs Presented at 2d All-Union Conf. on Neurocybernetics, Oct. 1965 (See N67-36129 21-04)

A general discussion is presented of the basic prerequesites for simulation of human memory in the light of certain assumptions of neurophysiology and biocybernetics. Some arguments are briefly outlined on the model simulating the human memory. R.Ll.

N67-36132# Joint Publications Research Service, Washington, D. C.

DYNAMICS OF IONIC CONDUCTANCES OF THE NERVOUS MEMBRANE

Yu. G. Antomonov *In its* Simulation in Biol. and Med., 3 Aug. 1967 p 14–21 refs (See N67-36129 21-04)

An attempt is made to describe the experimental facts obtained by Hodgkin–Huxley in a new way and confirm the correctness of the new mathematical interpretation of the dynamics of the ionic components by calculations and simulation. R.Ll.

N67-36133# Joint Publications Research Service, Washington, D. C.

THE IONIC THEORY OF EXCITATION OF NERVE TISSUE

A. B. Kotova *In its* Simulation in Biol. and Med., 3 Aug. 1967 p 22–28 refs (See N67-36129 21-04)

Open literature sources are briefly reviewed on the ionic theory of excitation of nervous tissue. Two hypotheses are assumed and outlined: (1) The total conductance of the membrane depends on the difference in the conductances with respect to the ions passing through the membrane from inside to outside and the ions passing through the membrane from outside to inside the nerve fiber (cell). (2) The process of generation of the spike potential is unstable in nature and takes place in accord with the principle of systems with positive feedback. R.Ll.

N67-36134# Joint Publications Research Service, Washington, D. C.

FEEDBACK IN THE BIOELECTRICAL CONTROL SYSTEM FOR THE MOVEMENTS OF MAN

L. S. Aleyev and S. G. Bunimovich *In its* Simulation in Biol. and Med., 3 Aug. 1967 p 29–34 refs (See N67-36729 21-04)

Feedback in the creation of technical systems for the control of the active motions of man is briefly considered. These active motions of humans are a complex process in which a large number of functional units participate. The control information comes from the central divisions of the nervous system to the servomechanisms of the organism (the muscles), being subject to correction at various stages of the passage. A block diagram of a multichannel control device with feedback circuits of the bioelectro-location type is depicted. R.Ll.

N67-36181*# Scientific Translation Service, La Canada, Calif.

ACCLIMATIZATION [ACCLIMATISATION]

R. Virchow Washington, NASA, Jul. 1967 13 p refs Transl. into ENGLISH from Z. Ethnologie (Germany), 1885 p 202–214 (Contract NASw-1496)

(NASA-TT-F-11147) CFSTI: HC $3.00/MF $0.65 CSCL 06P

Acclimatization of Europeans to hot climates is discussed. Experience in Algeria, Africa, Australia, Micronesia, and other places is described. A differentization is made between acclimatization of the individual and the race. Author

N67-36187*# American Inst. of Biological Sciences, Washington, D. C. Bioinstrumentation Advisory Council.

A SURVEY OF *IN VIVO* ENERGY SOURCES

J. J. Konikoff (GE, Valley Forge, Pa.) 1 May 1967 22 p refs Prepared in cooperation with General Electric Co. *Its* BIAC Inform. Module M9

(Contracts NASr-132; NAS2-140; Nonr-4526(04))

(AD-654702) CSCL 06B

Recent engineering advances in medicine have permitted the application of various protheses for the correction of physiological defects. Such devices as cardiac pacemakers, diaphragm stimulators, and artificial limbs have been greatly improved in effectiveness. Long term implants of electronic gadgetry have also become relatively commonplace in the biomedical community as a means for measuring several physiological parameters in situ. In both cases cited above, the power supply plays a vital role--because of its impact on the volume and life of the device. Although miniature batteries are doing an effective job in these applications, their two- or three-year life requires surgical procedure for replacement. To reduce this, other energy sources are being investigated. One approach is to use the body during its normal functioning to drive an electric power source. Bioelectric potentials, muscle motions, and implanted fuel cells are some of the approaches being investigated with varying degrees of success. (Another approach is to transmit the power through the skin by inductive coupling or in the form of radio frequency energy. This technique relieves the problems of battery life since the power pack is external and can be easily replaced.) Author (TAB)

N67-36189# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.

MANUAL CONTROL SYSTEM ANALYSIS AND DESIGN USING A PARAMETER PLANE METHOD

S. Suh Aug. 1967 53 p refs

(RE-299)

An exact and useful graphic method for analyzing the stability of manual control systems including operator time delay is developed by using the parameter plane technique. This method can be applied to the analysis and design of n^{th} order control systems with two adjustable parameters. The aim is to derive and formulate the basic equations in a way that will be easily understood and to show by examples how the method can be applied to manual control systems. Author

N67-36407# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.

THE EFFECTS OF LOW MOLECULAR WEIGHT DEXTRAN ON CARDIOVASCULAR AND METABOLIC PARAMETERS IN DOGS Technical Report, Jan.–Mar. 1967

Eugene Evonuk and Francis J. Sullivan Jun. 1967 18 p refs

(AAL-TR-67-8; AD-655070)

Two series of experiments were carried out to determine the species specificity and some cardiovascular and metabolic responses to infused LMD (low molecular weight dextran, 40,000) in dogs. Cardiac output, limb blood flow arterial pressure, heart rate, hematocrit, circulating histamine levels, O2 corisumption, CO2 production, and respiratory minute volume were measured prior to and at various intervals after LMD infusion. The infusion of LMD resulted in a marked increase in limb blood flow, cardiac output, O2 consumption, and CO2 production, a decrease in hematocrit,

systemic and peripheral resistance, with no significant change in mean arterial pressure, heart rate, and circulating histamine levels. In dogs, these responses were, for the most part, in the opposite direction from those observed in the rat, and a species variability to infused LMD was indicated. It was concluded that the marked increase in peripheral blood flow was due to a slight hemodilution, a decrease in resistance with a resultant increased perfusion of blood throughout the entire capillary bed. These findings further support the use of LMD for the improvement of blood flow in some ischemic conditions. Author (TAB)

N67-36417# George Washington Univ., Alexandria, Va. Human Resources Research Office.

TRAINING RESEARCH UTILIZING MAN-COMPUTER INTERACTIONS: PROMISE AND REALITY

William A. McClelland Jun. 1967 19 p refs Presented at the Avionics Panel Program on Nat. and Artificial Logic Processors, AGARD, Athens, Jul. 1963 *Its* Profess. Paper 23-67

(Contract DA-44-188-ARO-2)

(AD-654818)

The paper was presented as part of the Avionics Panel Program on Natural and Artificial Logic Processors, sponsored by the Advisory Group for Aeronautical Research and Development, NATO. Several conceptual propositions in regard to man and the computer are offered. The nature of training research is examined. There is also a brief categorization of human behavior to suggest some of the uses and some of the difficulties in the utilization of computers in training research. The role of the training research psychologist dealing with large groups of people in mass instruction in a military setting is discussed, as is the importance of the computer for data processing and as a tool for simulating complex behavior. Author (TAB)

N67-36424# Technische Hochschule Munchen (West Germany). Fakultaet fuer Allgemeine Wissenschaften.

INVESTIGATIONS CONCERNING SHORT-CHAIN FATTY ACID SYNTHESIS IN *CI TYROBUTYRICUM* [UNTERSUCHUNGEN UEBER KURZKETTIGE FETTSAEURESYNTHESE IN *CI. TYROBUTYRICUM*]

Sandra K. Erickson (Ph.D. Thesis) Jul. 1966 66 p refs In GERMAN

Investigated was the incorporation and distribution of tritium in butyric and acetic acids which were formed through fermentation of various substrates in tritium-marked water by *Clostridium tyrobutyricum*. The values were approximately as theoretically expected during the synthesis of acetate by the Embden–Meyerhof method. Tritium incorporation and distribution was also studied in butyric and acetic acids which were synthesized by *Cl. tyrobutyricum* from such other marked substrates as glucose-1-T, glucose-6-T, acetate-2-T, pyruvate-3-T, mannite-2-T, glycerin-2-T, and lactate-2-T. Only a moderate number of back reactions occurred during the incubation of unmarked butyrate and acetate in tritium-marked water with reduced cells. The absolute configuration on C-3 of the butyrate, which is formed by the *Cl. tyrobutyricum* from mannite-2-T, was determined by means of the stereospecific-working propionyl-CoA-carboxylase. Transl. by K.W.

N67-36427# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

MEASUREMENT OF SERUM IONIC CALCIUM USING A SPECIFIC ION ELECTRODE, AUGUST 1966–JANUARY 1967

Dorothy E. Arnold, Marion J. Stansell, and Harry H. Malvin May 1967 15 p refs

(SAM-TR-67-43; AD-655062)

A recently developed calcium ion electrode was evaluated for use in the routine measurement of serum ionic calcium. The electrode, used in conjunction with an expanded scale pH meter, permits the direct and accurate assay of ionic calcium in fresh serum samples with a minimal expenditure of time and materials. Factors found to be critical to reliable operation include electrode mounting configuration, diluent for the calibration standards, sample preparation, control of pH, uniformity of sample volume and thermostasis. Analytic precision--a function of electrode placement, instrumental stability and readout parallax--is routinely excellent. Discrimination and recovery studies indicate the minimal assayable concentration differences to be between 0.2 and 0.3 mg.%. The electrode appears to be applicable to a wide variety of clinical and nonclinical investigations. Author (TAB)

N67-36429# General Dynamics Corp., Groton, Conn. Electric Boat Div.

RESEARCH AND DEVELOPMENT OF A WASTE MANAGEMENT UNIT FOR A MANNED SPACE VEHICLE Technical Report, Dec. 1965–Dec. 1966

John Dodson and Harold Wallman Wright-Patterson AFB, Ohio, AMRL, Apr. 1967 27 p refs

(Contract AF 33(615)-3340)

(U-413-66-145; AMRL-TR-67-2; AD-654306)

A waste management unit (laboratory model) for use in a space simulator was designed, fabricated, and tested. The unit was designed to: Support 4 men for 30 days. Operate for five 30-day simulated missions. Operate under weightless or normal gravity conditions. Collect urine and feces separately but simultaneously while the user is in the seated position. Collect urine when the user is in the standing position. The unit incorporates a single sphere to collect, dehydrate, and store feces. This precludes the necessity of manual transfer of waste. Positive odor control is achieved with a forced air flow. Author (TAB)

N67-36478# Johns Hopkins Univ., Baltimore, Md. Dept. of Statistics.

DIFFUSION OUT OF A TRIANGLE

W. Smith and G. S. Watson Jan. 1967 18 p refs

(Contract Nonr-4010(09); Grant NIH GM-1237-04)

(TR-67; AD-654459)

A problem in molecular genetics called for the following result. If a particle is dropped at random on a right-angled isosceles triangle, and thus allowed to execute symmetrical Brownian motion, the chance that it will first leave the triangle via the hypotenuse is 0.41062. An inequality and two methods of deriving this probability are illustrated. The most useful source of solutions to diffusion problems of this kind is the torsion problem of elasticity. Author (TAB)

N67-36480*# National Aeronautics and Space Administration, Washington, D. C.

EXTREMAL FACTORS OF LONG-TERM SPACE FLIGHT AND HEALTH REQUIREMENTS FOR SPACECRAFT CREWS [EKSTREMAL'NYYE FAKTORY DLITEL'NOGO KOSMICHESKOGO POLETA I TREBOVANIYA K SOSTOYANIYU ZDOROV'YA CHLENOV EKIPAZHEY KOSMICHESKIKH KORABLEY]

P. V. Buyanov and V. G. Terent'yev Aug. 1967 4 p refs Transl. into ENGLISH from Kosmich. Biol. I Med. (USSR), vol. 1, no. 2, 1967 p 52–54

(NASA-TT-F-11136) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Medical selection of spacecraft crews for long-duration space missions is discussed. In view of individual differences in functional limits and tolerance to flight factors, it is suggested to base physical aptitude requirements for candidates on the effect of environmental space flight factors upon the human organism and its tolerance limits. Positive selection is predicated on satisfactory resistance to space-simulation tests (acceleration, physical stress, oxygen starvation, orthostatic tests). Author

N67-36491*# AiResearch Mfg. Co., Los Angeles, Calif.

STUDY OF ASTRONAUT CAPABILITIES TO PERFORM EXTRAVEHICULAR MAINTENANCE AND ASSEMBLY FUNCTIONS IN WEIGHTLESS CONDITIONS

E. C. Wortz, L. E. Browne, W. H. Shreck, A. J. Macek, W. G. Robertson et al Washington, NASA, Sep. 1967 431 p refs
(Contract NAS1-5875)
(NASA-CR-859) CFSTI: HC $3.00 CSCL 05H

Experiments were conducted on man's capabilities to perform manual work in the weightless environment. More than 200 experimental conditions were studied. The independent variables were simulation techniques, tasks, locomotion aids, restraint devices, and tools. This document describes the final results of both the analytical and experimental studies. Conclusions are drawn with respect to the effects of the independent variables, the human engineering observation, quantitative analyses, and physiological parameters. Hypotheses are advanced concerning the improvement of work in the weightless environment. Author

N67-36527*# Stanford Univ., Calif. Instrumentation Research Lab.
MICROORGANISMS—EXPLORATIONS IN EXOBIOLOGY Status Report, 1 Oct. 1966–1 Apr. 1967
Joshua Lederberg and Elliott C. Levinthall 1 Apr. 1967 98 p refs
(Grant NsG-81-60)
(NASA-CR-88326; IRL-1056) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Technical details for continuing projects in exobiology are summarized. General project areas reported on include: fluorometry, gas chromatography and optical resolution, mass spectrometry, computer managed instrumentation, and atmospheric effects on photographic resolution. These projects contribute to technical mastery of problems in exobiology by furnishing specific analytical techniques of high sensitivity and discrimination for the detection of exotic life. A description of DENDRAL, a computer program used for generating and filtering chemical structures, is appendixed. R.Ll.

N67-36530# Technische Hochschule Munchen (West Germany). Fakultaet fuer Maschinenwesen und Elektrotechnik.
CONCERNING THE CONDUCTIVITY OF VARIOUS GASES IONIZED WITH TRITIUM BETA RAYS AND USE OF SUCH RAYS AS ATMOSPHERIC ION SOURCES IN THE BIOCLIMATOLOGY [UEBER DIE LEITFAEHIGKEIT VERSCHIEDENER MIT TRITIUM-BETA-STRAHLERN IONISIERTER GASE UND DIE ANWENDUNG SOLCHER STRAHLER ALS LUFTIONENQUELLE IN DER BIOKLIMATOLOGIE]
Umur Buektas (Ph.D. Thesis) 1966 190 p refs In GERMAN

The ionization characteristics of tritium beta rays are studied in air, oxygen, nitrogen, carbon dioxide, and argon. Measured was the dependence of the ionizing current on electric field strength, gas pressure, and gas temperature, and from measurements of the maximum ion yield of tritium sources in dependence from gas pressure it was possible to determine the range of 18 keV-electrons. The measuring method can also be used to obtain information on the energy dependence of the actual range of medium-energy electrons. Other experiments were conducted to determine the bioclimatic effect of atmospheric ions produced by tritium beta rays on several physiological parameters, among them the breathing and pulse frequencies of humans. An improved electronic method and a fully transistorized apparatus were also developed for measurements in these experiments. Transl. by K.W.

N67-36580*# IIT Research Inst., Annapolis, Md.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Quarterly Status Report, 31 May–31 Aug. 1967
Aug. 1967 11 p
(Contract NASr-22/14-003-001)
(NASA-CR-88134; IITRI-L6023-10) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Summary experimental results are presented on life processes in simulated planetary environments. *B. cereus* and PA 3679 spore suspensions were heat-shocked at 80°C for 10 minutes just before use. Soil ecology experiments initiated were divided into key, or screening, and testing, or confirmatory types. The effect of 100% carbon dioxide at 5 mb pressure on *S. aureus* is shown graphically. The soil ecology experiments in a simulated Martian environment were conducted to evaluate the minimum moisture and numbers required for growth and survival of the following microorganisms: *Bacillus cereus, Lactobacillus plantarum, Pseudomonas aeruginosa,* Putrefactive Anaerobe (PA 3679), *S. aureus,* and *Streptomyces albus.* R.Ll.

N67-36592*# Martin Co., Baltimore, Md. RIAS Div.
CHEMOSYNTHETIC GAS EXCHANGER Final Report, 8 Jun. 1964–14 Mar. 1967
Leonard Bongers and John C. Medici Apr. 1967 66 p refs
(Contract NASw-971)
(NASA-CR-88357; ER-13634-11) CFSTI: HC $3.00/MF $0.65 CSCL 06K

A chemosynthetic bioregenerative system for use in long-term space exploration is described that employs a functional coupling of electrolysis of water with biosynthesis by hydrogen bacteria. A considerable portion of man's metabolic wastes can be processed and recycled in this ecosystem; and presently available information indicates that the generation of hydrogen and oxygen by electrolysis is about 80% efficient. Both batch and continuous operations are discussed as cultivation procedures; and aspects of the chemical and physical environment considered are temperature, pH effects, inorganic nutrition, gas supply, and material balance in a closed environment. The efficiency of ATP formation and of carbon dioxide conversion is treated, along with the effect of oxygen on cytochromes. M.W.R.

N67-36613* Oregon State Univ., Corvallis.
SYSTEMATIC DESCRIPTION AND KEY TO ISOLANTS FROM HILGARD SOILS
W. B. Bollen and Karen M. Byers 12 Jun. 1967 111 p Prepared for JPL
(Contracts NAS7-100; JPL-950783)
(NASA-CR-88114) CSCL 06M

Species designations are given for a list of organisms that are isolants from the Hilgard soils. A dichotomous key separates these isolants into four groups, and descriptive charts are arranged in these groups. Each of the charts includes staining and morphological, cultural, and physiological characteristics. Of the 58 surviving isolants, the percentage in each group are as follows: bacillus, 75.9%; soil diphtheroid, 15.5%; actinomycetes, 3.4%; yeast, 1.7%; micrococci, 1.7%, and gram negative, 1.7%. M.W.R.

N67-36614# Educational Testing Service, Princeton, N. J.
TRANSFER OF METAL ABILITIES AT DIFFERENT STAGES OF PRACTICE IN THE SOLUTION OF CONCEPT PROBLEMS
C. Victor Bunderson (Ph.D. Thesis Princeton Univ.) May 1967 113 p refs
(Contracts Nonr-1858(15); Nonr-2214(00); Grant NSF GB-3402)
(RB-67-20; AD-654202)

Theories of learning have typically failed to give an account of the role of human abilities, while accounts of mental abilities have not explained their relationship to learning in any rigorous way. The purpose of this study was to investigate the relationship of a set of factor-analytically derived ability measures to performance at different stages of practice in a learning set task employing concept problems, and to consider possible constructs to explain these relationships. Twenty-six problems, each of which required the identification of a four-dimensional conjunctive concept, were administered to a sample of 145 Princeton University undergraduates. To account for the complex learning involved in this task, a conceptual model involving information-processing constructs was developed. Three higher-order processes were postulated: a problem

analysis process, which defined gaps between information available and information needed for solution; a search process, which looked among available responses for operators to reduce or to remove these gaps; and an organization process, which integrated operators thus found into a terminal program for solving the problems. A battery of 30 mental tests was administered to the same sample of students. The tests were selected as measures of factors chosen for their relevance to the model. The intercorrelations among the test scores were factor analyzed by a maximum-likelihood procedure. This procedure extracted factors in accordance with a simple-structure hypothesis set up in advance. A statistical test of this hypothesis showed it to be tenable. Author (TAB)

N67-36656# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

BIOPHYSICAL MECHANISMS AND SCALING PROCEDURES APPLICABLE IN ASSESSING RESPONSES OF THE THORAX ENERGIZED BY AIR-BLAST OVER-PRESSURES OR BY NON-PENETRATING MISSILES

I. G. Bowen, E. R. Fletcher, D. R. Richmond, F. G. Hirsch, and C. S. White November 1966 46 p refs

(Contract DA-49-146-XZ-372)

(DASA-1857)

A mathematical model was described that was devised to study the dynamic response of the thorax of mammals to rapid changes in environmental pressure and to non-penetrating missiles impacting the rib cage near the mid-lateral point of the right or left thorax. Scaling procedures for similar animals were described relating, for a given degree of damage, the body mass of the animal to various parameters describing the exposure dose. Internal pressures computed with the model for a dog exposed at the end plate of a shock-tube were compared to those measured with a pressure transducer inserted in the esophagus down to the level of the heart. Computed time-displacement histories of missiles following impact with the right side of the thorax were compared to those obtained experimentally by means of high-speed motion picture photography. High internal pressures predicted with the model for non-penetrating impact were compared to those obtained experimentally and theoretically for exposure to air blast. Experimental data were presented arbitrarily assessing lung damage in animals struck by non-penetrating missiles (constant impact area) as a function of missile mass and impact velocity. These data were compared for several missile mass-velocity combinations with those computed using the mathematical model. Similarities in the dynamic responses of the thorax to air blast and to non-penetrating missiles were discussed. Author (NSA)

N67-36679# Bendix Corp., Davenport, Iowa. Pioneer-Central Div.

SUBCRITICAL LIQUID OXYGEN STORAGE AND SUPPLY SYSTEM FOR USE IN WEIGHTLESS ENVIRONMENTS Final Report, 1 Jan. 1965–3 May 1966

H. Robert Lundeen Wright-Patterson AFB, Ohio, AMRL, Apr. 1967 70 p refs

(Contract AF 33(615)-2308)

(AMRL-TR-66-178; AD-655359)

A subcritical liquid oxygen storage and supply system for use in weightless environments was designed, combining the properties of the capillary-wick to displace gas phase from a two-phase mixture, thus assuring liquid phase delivery, with the dominant surface tension forces which cause liquid phase to accumulate at the periphery and gas phase to locate at the center of a spherical container in a weightless environment. A 10-liter prototype unit was fabricated based on these concepts. The complete system includes, in addition to the storage container, associated temperature, pressure, acceleration, and strain sensors to monitor system performance in weightless conditions. Liquid phase delivery from the pressure vessel has been demonstrated by the oxygen-nitrogen mixed gas test technique. The testing program conducted on the prototype unit gave every indication that the design concept is satisfactory for weightless operation. Author (TAB)

N67-36683# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

CALCULATION OF TIME-TEMPERATURE HISTORIES AND PREDICTION OF INJURY TO SKIN EXPOSED TO THERMAL RADIATION

John A. Weaver 14 Jun. 1967 38 p refs

(NADC-MR-6623; AD-655438)

A general description is given of a digital computer program used in connection with the study of injury of skin exposed to thermal energy. All of the information necessary for a detailed understanding of the program is included; however, the material is presented in a manner such that a novice in the field of computer science may make use of the program if he so desires. For this reason emphasis is placed on the operating instructions for the program. A short discussion of the pertinent theory and equations as they apply to the human skin is included at the beginning of this report. Author (TAB)

N67-36688# Aerospace Medical Div. Aerospace Medical Research Labs (6570th), Wright-Patterson AFB, Ohio.

EFFECTS OF PRIMARY TASK PERFORMANCE ON RESPONSE TIME TO TOGGLE SWITCHES IN A WORKSHOP CONFIGURATION Technical Report, Oct. 1965–Feb. 1966

Earl D. Sharp Apr. 1967 42 p refs

(AMRL-TR-66-190; AD-655770)

The study was designed to determine interaction effects of central tracking performance and performance on variously located toggle switch controls. Subjects were required to operate toggle switches located in various positions to their left while maintaining control of a primary tracking task. Performance times for toggle switch operation and absolute integrated error scores corresponding to each toggle switch location were collected and analyzed. The results indicated that: (a) Variation of toggle switch location had no effect on tracking performance. (b) Vertical displacement of toggle switch controls affected only the reach time, while angular displacement affected only the manipulation time. The results of this study were compared with the results of a study completed earlier which used a centrally located fixation point rather than a tracking task. With the tracking task substituted in place of the fixation point, the reaction time (the time to release the starting switch) to secondary control operations decreased. Author (TAB)

N67-36709# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

PHYSIOLOGICAL PRINCIPLES OF A SOJOURN OF A HUMAN IN CONDITIONS OF RAISED PRESSURE OF THE GASEOUS MEDIUM

G. L. Zal'tsman 17 Apr. 1967 190 p refs Transl. into ENGLISH of the book "Fiziologicheskiye Osnovy Prebyvaniya Cheloveka V Uslouiyakh Povyshennogo Davleniya Gazovoy Sredy' Leningrad, Medgiz. p 1-166

(FTD-MT-65-245; TT-67-62351; AD-655360)

The monograph describes the manifold processes arising in the organism with an increase in the pressure of oxygen, air, and artificial gas mixtures. Various types of physiological effect of raised pressures are analyzed in the light of contemporary concepts of the stimulus, the process of irritation, and physiological and pathological response reactions. For the study of the state a human in the conditions of the applied pressures of the gaseous environment there are developed methodical procedures which allow characterization of nervous processes from elementary unconditioned responses to complicated cortical reactions. As a result of the investigations three types of suppression of the work of the brain which arise under the action of raised pressures are singled out. TAB

N67-36710*# Sandia Corp., Albuquerque, N. Mex.
PRINCIPLES OF OPERATION OF THE VACUUM PROBE MICROBIOLOGICAL SAMPLER
V. L. Dugan Aug. 1967 26 p refs
(Contract NASA Order R-09-019-040)
(NASA-CR-88381; SC-RR-67-688) CFSTI: HC $3.00/MF $0.65 CSCL 06B

This paper contains the detail drawings which describe the physical design of the vacuum probe, which has been designated the "hand probe" or the "filter probe", and a suggested protocol for the repeated use of this instrument. Also included are a discussion of how the probe's critical orifice varies with atmospheric pressure and vacuum pressure and how small particles may be influenced by the sonic noise which is produced by the operation of the orifice. Author

N67-36721* Southern Illinois Univ., Carbondale. Physiology Dept.
ABSORPTION KINETICS OF GLYCINE IN MACRACANTHORHYNCHUS HIRUDINACEUS (ACANTHOCEPHALA)
Arthur Andre Swanson, III (M.S. Thesis) Aug. 1966 43 p refs
(Grant NGR-14-008-003)
(NASA-CR-88384) CSCL 06M

An investigation was made of the kinetics involved in the absorption of glycine in *Macracanthorhynchus hirudinaceus* over an extended period, including the effect of glycine concentration of absorption rate, the effect of other amino acids and cyanide on glycine absorption, pH effect on glycine absorption, and glycine metabolism and distribution. Results show that diffusion seems to be the dominant mechanism of glycine absorption in *M. hirudinaceus*. Glycine distribution is uniform over the entire body and its metabolism is mainly in protein synthesis. The pH curve of glycine absorption is between pH 7.0 and 9.0. This is an indication of the membrane properties of the organism which accepts the glycine more readily in its neutral form. R.N.A.

N67-36723# Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
A COMPUTER SIMULATION EXPERIMENT OF SUPERVISORY CONTROL OF REMOTE MANIPULATION
Simon G. McCandlish Apr. 1967 76 p refs
(Contract AF 19(628)-3317)
(DSR-79960-5; ESD-TR-67-290; AD-655375)

The long term aim of this work is the modeling of the process by which the human commands and controls a real-time information system containing automatic subroutines which may be used to accomplish portions of the task. Remote manipulation is believed to have all the typical attributes of such a system yet be simple enough to be amenable to laboratory investigation. This report describes a computer simulation of a remote manipulation task and rate-controlled manipulator; into the latter was built some low-level automatic decision making ability which could be used at the operators discretion to augment his direct continuous control. Under experimental investigation were the effect of transmission delay, dynamic lag and intermittent vision on human manipulative ability. This report describes further experiments in which the operator called in sequence various on-site automatic control programs of the machine, and thereby acted as a supervisor. The results suggest that the supervisory mode of operation has some advantages when the task to be performed is difficult for a human controlling directly. Results show the supervisory mode to require more training than the direct mode. TAB

N67-36727# Federal Aviation Agency, Oklahoma City, Okla.
A PROTECTIVE PASSENGER SMOKE HOOD
Ernest B. McFadden, H. I. Reynolds (Schjeldahl (G. T.) Co.), and Gordon E. Funkhouser Apr. 1967 14 p refs
(AM-67-4) CFSTI: HC $3.00/MF $0.65

Several recent jet transport accidents have focused the attention of the aviation industry upon smoke and toxic gases as causal factors of passenger incapacitation and failure to evacuate aircraft before fire and heat render the environment uninhabitable. If it were possible to provide passengers with a short duration supply of breathing air sufficient to maintain the passengers' mobility and allow completion of aircraft evacuation, survival would be enhanced. Simple, light-weight, bag-shaped hoods incorporating a neck seal were fabricated of a thin pliable, high-temperature, transparent, polyimide plastic film. Polyimide film has no melting point but reportedly chars at 1500°F. In a more advanced design, thin transparent metallic coatings were applied to the polyimide film in order to reflect up to 90% of the radiant heat. Upon exposure to a specific infra-red heat flux, facial skin temperatures of 114–115°F were recorded on twelve human subjects wearing the non-metalized hood. Under identical conditions, skin temperatures of the same subjects wearing the metalized hood did not exceed 99°F. Capability of the hood to provide short term and extended protection from smoke and flame inhalation in a fire environment is discussed. Author

N67-36735# Authority Health and Safety Branch, United Kingdom Atomic Energy Authority, London (England).
THE APPLICATION AND INTERPRETATION OF ICRP RECOMMENDATIONS IN THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY (JUNE 1967)
H. J. Dunster Harwell, Engl., Jun. 1967 25 p refs
(AHSB/RP/-R-78) CFSTI: HC $3.00/MF $0.65

Numerical values of dose limits are summarized, and applications of the recommended values are described. Maximum permissible doses and derived working limits for exposure of workers and the public are given and the data are tabulated. Predictable working conditions as well as emergency and accidental exposures are discussed. N.E.N.

N67-36756* Systems Technology, Inc., Hawthorne, Calif.
A NEUROMUSCULAR ACTUATION SYSTEM MODEL
D. T. McRuer, R. E. Magdaleno, and G. P. Moore 1967 38 p refs
(Contracts NAS2-2824; AF 33(657)-10835)
(NASA-CR-73128) CSCL 06P

Recently both high quality physiological data and human operator describing function data of low variability and large dynamic range have become available. These data lead to control engineering descriptions for neuromuscular actuation systems which are compatible with the available data and which provide insight into the overall human control structure (e.g., the types of feedback systems used for various inputs). In this paper, some of these physiological and human operator data are briefly reviewed, and a simple neuromuscular actuation system model is presented. The pertinent human operator describing function data include the covariation of high and low frequency phase data and the describing function variation of high frequency phase with tension. The simplest neuromuscular model suggested by and compatible with these data is one in which muscle spindles provide both a feedback function, an operating point or bias adjustment, and at least one command path. Author

N67-36762 Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Bad Godesberg (West Germany). Institut fuer Flugmedizin.
THE APPLICATION OF THE OXYGEN RESPIRATION DURING THE DECOMPRESSION OF CAISSON WORKERS AT THE CONSTRUCTION PLACE ROHRTUNNEL BRUNSBUETTELKOOG [DIE ANWENDUNG DER SAUERSTOFFATMUNG BEI DER AUSSCHLEUSUNG VON DRUCKLUFTARBEITERN AUF DER BAUSTELLE ROHRTUNNEL BRUNSBUETTELKOOG]
Otto Wuensche, Hans Dietrich Fust, and Gerhard Pressel Jul. 1967 35 p refs In GERMAN; ENGLISH summary
(DVL-663; DLR-FB-67-47)

The effectiveness of oxygen decompression procedures was studied, improved, and statistically verified. Oxygen respiration equipment is described and illustrated. A comparison is made of the rate of incidence of decompression sickness during decompression with compressed air and oxygen respiration. Workers were observed and examined during a four-month period while on six and eight-hour shifts at a pressure of 2.2 kp/cm^2. Decompression by oxygen respiration resulted in a sharp decrease in the rate of sickness. Results are also presented of examinations which determined the number of leukocytes and eosinophile blood cells. Transl. by K.W.

N67-36769* Arkansas Univ., Fayetteville.
[THE ROLE OF NUCLEOTIDE METABOLISM IN THE REPAIR OF RADIATION INJURY] Annual Report
Glenn V. Dalrymple [1967] 36 p refs
(Grant NGR-04-001-014)
(NASA-CR-88379) CSCL 06R

A research program summary results are presented on the effect of radiation on L cells during the immediate post-irradiation period. Also described is the effect of 2,4-dinitrophenol on the radiation sensitivity of L cells. The non-linear method for the fitting of cell survival curves is investigated. Autoradiographic and survival studies with synchronous L cells are reported. R.LI.

N67-36780# Authority Health and Safety Branch, United Kingdom Atomic Energy Authority, London (England).
THE STANDARDISATION OF PRESSURISED SUITS
W. A. Langmead Harwell, Eng. Jun. 1967 22 p refs
(AHSB/RP/-R-76) CFSTI: HC $3.00/MF $0.65

Described is the work toward specification of standards for light-duty pressurized suits and blouses, personnel air hoses, air-line hoods, oversuits, and connecting fittings. The main effort was to establish a standard PVC pressurized suit. Covered in this study are existing PVC pressurized suits, basic design principles, properties of PVC materials, and costs. Also briefly discussed are the results of operational testing of prototype PVC pressurized suits, blouses, and hoods, and the changes in design that were made following the tests. K.W.

N67-36805# Block Engineering, Inc., Cambridge, Mass.
INVESTIGATION OF INTERFEROMETRY FOR THE ANALYSIS OF ENCLOSED HABITABLE ATMOSPHERES Final Report, Dec. 1965–Dec. 1966
Richard N. Briskman and Jacob Morris Weinberg Wright-Patterson AFB, Ohio, AMRL, Feb. 1967 201 p refs
(Contract AF 33(615)-3374)
(AMRL-TR-66-236; Rept.-8360; AD-655396)

To develop a small and highly sensitive optical spectrometer for providing repeatable qualitative and quantitative analysis of contaminant gases in enclosed habitable atmospheres, a feasibility study and measurements program was conducted. An infrared interferometer spectrometer was employed in conjunction with a gas absorption cell for trace gas analysis. During the program, spectra were taken of 43 compounds, 10 binary, 10 trinary, 5 five-order, and 1 fifteen-order mixture. Typical minimum detectable concentrations range from 1 to 40 mg/l. The results of this program have defined a system that will satisfy the criteria for a prototype flight instrument. Author (TAB)

N67-36806# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
TEMPORAL AND LUMINOUS CALIBRATION OF THE NAVY FLASHBLINDNESS TRAINING DEVICE
Gloria T. Chisum 30 Jun. 1967 17 p ref
(NADC-MR-6706; AD-655435)

Temporal and luminance measurements of the energy output of the Navy flashblindness training device developed by BioTechnology, Inc. were made by personnel of the U. S. Naval Air Development Center. The purposes of these measurements were to determine the temporal characteristics of the flash, the spectral distribution of the visible portion of the energy, the illumination at the cornea and on the retina of an observer. Plots are given in the report which show the results of these measurements. Results indicated that the illumination produced by the flash source at the corneal plane is 637.8 lumen-seconds/sq cm. Author (TAB)

N67-36818# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
HUMAN ACCELERATION EXPERIENCE AT THE AEROSPACE MEDICAL RESEARCH DEPARTMENT, U.S. NAVAL AIR DEVELOPMENT CENTER—JOHNSVILLE: 1 JANUARY 1961–30 DECEMBER 1965
Elihu York, R. J. Oleynik, and R. M. Patton 31 May 1967 18 p refs
(NADC-MR-6711; Rept.-12; AD-655436)

A five year retrospective survey was undertaken in order to learn the consequences of acceleration exposure on human subjects. Utilizing a punched-card data system, 5071 human subject runs involving 380 individuals were analyzed. Symptomatology occurred in 75% of Gz runs and 52% of Gx runs. During 2380 +Gz runs greyout was noted 351 times and blackout 167 times; during 2557 +Gx runs, chest pain occurred 104 times, motion sickness 97 times, cardiac arrythmia and dyspnea 29 times each. Miscellaneous complaints during acceleration included myalgia, headache and abdominal pain. No disabling sequelae were noted in any subject. A medical monitoring system comprised of voice communication, television observation, and electrocardiographic recording from the subject proved to be a safe system for recording minimal responses. As man is exposed to more hazardous environments of high-performance jet aircraft or space capsules, more detailed information involving further experimentation with the human centrifuge may be required, employing complex monitoring systems, in order to gain adequate knowledge of mans tolerance to acceleration, an important variable affecting manned flight. Author (TAB)

N67-36819# Army Medical Research Lab., Fort Knox, Ky.
SUBJECTIVE ESTIMATION OF EFFORT, RESERVE, AND ISCHEMIC PAIN Interim Report
Lee S. Caldwell and Richard P. Smith (Louisville Univ.) 12 May 1967 16 p refs
(Rept.-730; AD-655568)

Two studies were conducted to compare: (1) ratings of pain and effort induced by a muscle contraction maintained to the limit of endurance; and (2) estimates of effort and reserve using five- and ten-point scales both covering the same range of sensations. No overall differences were found between the ratings of pain and effort, though there was statistical evidence that the two scales diverged as the contraction time increased, or as the sensations increased in intensity. The rate of growth of the sensations of pain and effort were influenced by the strength of the muscle contraction. The ratings of effort and reserve were highly correlated, and significantly different only for the five-point scale. There was no indication of a divergence of the ratings of effort and reserve with contraction time. The results of both studies indicate that Ss are capable of reliably scaling the subjective experiences produced by strenuous physical exertions. Author (TAB)

N67-36830# Army Natick Labs., Mass. Food Lab.
HYGROSCOPIC EQUILIBRIUM AND TEXTURE OF FREEZE-DRIED FOODS
John G. Kapsalis Jun. 1967 185 p refs
(TR-67-87-FL; AD-655488)

Improved methodology for the objective evaluation of food texture was applied to the measurement of the textural parameters of special freeze-dried foods which were storage-equilibrated under different relative humidity conditions. The foods included pre-cooked freeze-dried beef, laminated freeze-dried products in the form of

bite-size sandwiches, and compressed freeze-dried cubes, all of which were designed for consumption without prior rehydration. The results showed that increasing relative humidity from zero to 66% caused an increase in hardness and cohesiveness, and, in certain foods, a decrease in brittleness (crushability index). This was more pronounced at equilibrium points above the B.E.T. value for a monomolecular layer of water. Plots of physico-chemical parameters of water vapor sorption versus rheological properties at different points of the moisture sorption isotherm were examined. The selection of certain target relative humidity values to minimize undesirable changes upon storage, and promising avenues for continued work on the textural quality and acceptability of special freeze-dried foods are discussed. Author (TAB)

N67-36834*# Army Natick Labs., Mass. Advanced Projects Div.
EXPERIMENTAL STUDY OF A PASSIVE THERMAL CONTROL SYSTEM FOR SPACE SUITS Status Report, 17 Jan.–17 Jul. 1967
Ferdinand Votta, Jr. 24 Jul. 1967 17 p
(NASA Order R-135)
(NASA-CR-88546; SR-9) CSCL 06K

A design concept was tested under simulated space conditions, and its operating characteristics were studied using various materials of constructions. The proposed system requires an impermeable membrane and a permeable membrane which need not be selective. The features of the system include a skin separated from the impermeable membrane by a narrow air gap controlled by a spacing material. The air gap keeps the skin dry and contains the life support gas at the required pressure, while the impermeable membrane prevents the escape of the life support gas. The covered impermeable membrane is in contact with a wet wick which itself is covered by a permeable membrane. The permeable membrane is separated from an outer impermeable membrane by a porous vapor space vented to space through a pressure control valve. Cooling is thus obtained by the controlled diffusion of water vapor through the permeable membrane and vaporization of the water into the vapor space. The results indicate that it is possible to design a passive thermal control system which will remove heat from a man in a space suit at rates in excess of 3000 Btu/hr without depending on sweating, maintaining the man in a relatively dry environment. K.W.

N67-36846# Michigan Univ., Ann Arbor. Human Performance Center.
COGNITIVE FACTORS IN INFORMATION PROCESSING
Paul M. Fitts Feb. 1967 34 p refs Presented at the XIV Intern. Congr. of Psychology, Washington, D. C., 26 Aug. 1963 Sponsored by ARPA
(Contract AF 49(638)-1235)
(AFOSR-67-1802; MEMO-1; AD-656714)

The general framework proposed to use in interpreting human information-processing behavior is that of a program for processing data. The term program as used in this report has essentially the same meaning, and is presumed to serve a similar function, as does the program which governs an electronic data-processing system or any organization of people engaged in a complex task or production. Reference to the analogy between human functions and a stored-program computer, as various writers have emphasized, permits us to talk about alternative processes or procedures for operating on data in complex ways, independently of the particular data on which these operations are performed or the particular system that is processing the data. Author (TAB)

N67-36847# Army Natick Labs., Mass. Clothing and Organic Materials Div.
ELECTRICALLY HEATED HANDWEAR
Herman Madnick and Alice Park Mar. 1967 23 p refs *Its* Ser. C&ED-46
(TR-67-82-CM; AD-656742)

Electrically heated handwear is presented as a solution to the hand-protection problem for equipment operators and other military personnel who must use their hands in extremely cold conditions for prolonged periods. The problem of hand cold injury, the inadequacy of conventional solutions and existing handwear, and various experimental approaches are discussed. The U.S. Army Natick Laboratories has assembled an auxiliary electrical handwear system and is continuing research efforts to improve electrically heated handwear. It is concluded that because of the demonstrated need for such handwear and the current feasibility of manufacturing it, electrically heated handwear should be supplied to the appropriate personnel. Author (TAB)

N67-36861# Air Force Systems Command, Wright-Patterson AFB, Ohio. Aerospace Medical Research Labs.
A STUDY OF SIMULATOR CAPABILITIES IN AN OPERATIONAL TRAINING PROGRAM Final Report, May 1965–Aug. 1966
Donald E. Meyer, Ralph E. Flexman, E. A. Van Gundy (FAA), David C. Killian (United Airlines Training Center), and C. J. Lanahan (Airline Pilots Assoc.) May 1967 54 p
(AMRL-TR-67-14; AD-656308)

The experiment was conducted to determine the effects of simulator training to criterion proficiency upon time required in the aircraft. Data were also collected on proficiency levels attained, self-confidence levels, individual estimates of capability and sources from which that capability was derived. Subjects for the experiment were 48 airline captains transitioning into the DC-8 aircraft. The subjects were equally assigned to experimental and control treatment groups. Subjects in the experimental group were trained in the DC-8 simulator for as much time as required to satisfy their instructors that they could perform the required maneuvers in the simulator at the same level of proficiency required to pass the final qualifications check in the aircraft. The control group was trained using the standard curricula which required a fixed time in the simulator. Data obtained from student reactions to questionnaire items are interpreted to indicate that: (1) simulators can be used to further reduce requirements for training time in aircraft; and (2) simulators can be used to evaluate performance that is indicative of performance in the aircraft. Author (TAB)

N67-36870# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
A QUANTITATIVE THEORY OF RECOGNITION
Alex Grumet Sep. 1967 83 p refs
(RE-303) CFSTI: HC $3.00/MF $0.65

A universal quantitative measure of recognition is defined in terms of resolvable units of the feature of the object to be recognized and the sensor that perceives it. Parameters normally associated with recognition such as range, noise, sensor, resolution, and environment of background are included in the recognition measure. Feature recognition, object recognition, and processor recognition are defined and examples are given of each. Recognition noise is defined, and the effect of noise on recognition is shown to be equivalent to a reduction of resolution. The relationship between the quantitative recognition measure and autocorrelation theory, as well as decision theory, are discussed. Application of the recognition measure to the solution of mathematical expressions is demonstrated. Author

N67-36893# Cajal Inst., Madrid (Spain).
NEURONAL PATTERNS ASSOCIATED WITH AFFECTIVE RESPONSES Final Scientific Report, 1 Feb. 1966–31 Jan. 1967
Antonio Fernandez De Molina 15 Feb. 1967 15 p refs
(Contract AF 61(052)-939)
(AFOSR-67-1604; AD-655796)

The properties of the fibres of the stria terminalis have been analyzed on the basis of threshold, conduction velocity and

absolute refractory period in anesthetized cats in which the stria terminalis was widely exposed. Both, fast and slow fibres, relay in the bed nucleus of the stria. Spontaneous unitary activity in the anterior and ventrome - dial hypothalamus had a predominant frequency of 6/sec., being both facilitated and inhibited by amygdaloid stimulation. Correlation of neuronal firing patterns, amygdaloid efferent pathways and location of units has been analized. Author (TAB)

N67-36895# Naval School of Aviation Medicine, Pensacola, Fla.
MORALE AS A FUNCTION OF SELF-DEFINITION AND STAGE OF TRAINING
George M. Rickus and Rosalie K. Ambler 15 May 1967 14 p refs
(NAMI-1007; AD-655818)

Seven hundred and seven naval aviation trainees from three stages of training were administered an anonymous questionnaire that asked them to give their own definition of morale. They were then instructed to rate their own morale on a ten-point scale using their definition as a frame of reference. A content analysis of the definitions identified the following categories: task oriented, group oriented, and self oriented. Mean morale rates were obtained for the subjects falling in each of the definitional categories and stages of training. The results showed that morale increased as trainees progressed from pre-flight to basic flight training, that morale level varied as a function of the definition expressed, and that the definition expressed was a function of the stage of training experienced. Author (TAB)

N67-36897# Mitre Corp., Bedford, Mass.
STUDIES IN DISPLAY SYMBOL LEGIBILITY. PART XVIII: THE RELATIVE LEGIBILITY OF UPPERCASE AND LOWER CASE TYPEWRITTEN WORDS
Glen C. Kinney and Diana D. Showman Jun. 1967 43 p refs
(Contract AF 19(628)-5165)
(MTR-394; ESD-TR-67-106; AD-655798)

The relative legibilities of common words typewritten in all-uppercase and all-lowercase letters were studied in three experiments. Human subjects identified the words shown one at a time for a short period. All-uppercase printing was found to be significantly more legible than all-lowercase in all three experiments. The word-form of all-lowercase words was not found to influence word identification. The use of uppercase letters is recommended for displays. Author (TAB)

N67-36964* Southern Illinois Univ., Carbondale.
[EFFECT OF CHRONIC RESTRAINT ON ABSORPTION FROM THE GASTROINTESTINAL TRACT]
George H. Gass [1960] 27 p refs
(Grant NGR-14-008-003)
(NASA-CR-88512) CSCL 06C

A comparative analysis is presented on restrained and unrestrained (control group) male rats to determine the influence of absorption from the gastrointestinal tract. Food and water were allowed *ad libitum*; however, food was removed 24 hours prior to *in vivo* experiments to reduce the contents of the gastrointestinal tract. It was found that more deaths occurred in restrained than control animals, and no deaths occurred after the 13th week. Restrained animals do not grow as fast nor grow as large as unrestrained animals, but do continue to grow. No difference was observed between groups in either adrenal or thymus gland weights. R.LI.

N67-36984# Bendix Corp., Davenport, Iowa.
REGENERATIVE CARBON DIOXIDE ADSORPTION SYSTEM USING CHARCOAL Final Report, 1 Apr. 1965–30 Sep. 1966
Peter Wildermuth Wright-Patterson AFB, Ohio, AMRL, May 1967 53 p
(Contract AF 33(615)-2443)
(AMRL-TR-67-48; AD-656786)

A system was designed and built for testing activated charcoal as a regenerative carbon dioxide adsorbent in an atmosphere involving oxygen pressures of 240-275 mm Hg. The system gas flow rate was 160-340 liters/minute. The gas stream was composed of oxygen, humidified to 50%. Carbon dioxide was added to simulate the production rate of two men. Because of the sub-atmospheric operation, the system was a closed loop design and any carbon dioxide not adsorbed on the first pass through the charcoal continued to circulate through the system. The charcoal was subjected to an ambient room temperature of approximately 27C, and the gas stream controlled at 26.7 plus or minus 2.7C during the adsorption testing. Regeneration of the charcoal was by vacuum. The testing program demonstrated that charcoal will continue to adsorb carbon dioxide at a significant rate after repeated cycling with no apparent change or degradation. The presence of water vapor in the gas stream tends to reduce the capacity of the charcoal for adsorbing carbon dioxide. However, it is readily removed from the charcoal by vacuum and exhibits no cumulative effect on the carbon dioxide adsorptive capacity of the charcoal. Author (TAB)

N67-36991*# California Univ., San Diego. Visibility Lab.
COMPUTERIZED VISIBILITY CALCULATIONS MAXIMUM SIGHTING RANGE PROGRAM
Ivan Harry Barkdoll III Jul. 1967 126 p refs
(NASA Order R-139; Contract NObs-92058)
(NASA-CR-88157; AD-655470) CFSTI: HC $3.00/MF $0.65 CSCL 05H

The report describes the development of computer programs for the performance of visibility calculations. The computer programs use input data as to the directional reflectance properties of both object and background to determine the inherent contrast of the object for a particular path of sight. Atmospheric contrast transmittance for the path of sight is calculated from input atmospheric data in the form of path luminance and beam transmittance. The inherent contrast is then multiplied by the contrast transmittance to find the apparent contrast. These calculations are repeated for selected distances from the object to determine that range at which the apparent contrast of the object matches the contrast threshold for the human visual system for the angular subtense of the object as viewed at that distance, and for the adaptation level specified. The vision data used in the calculation is the Tiffany data and represents best visual performance, in that the stimulus duration was long, the observers knew where the object was located, and the observers were allowed to fixate in any manner of their choosing. Therefore, ranges calculated from this vision data are called maximum sighting ranges. The computer program described in this report calculates maximum sighting ranges for 57 paths of sight defining hemispherical volume within which the object can be detected. TAB

N67-36996# School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF NITROGEN DIOXIDE–NITROGEN TETROXIDE ON OXYHEMOGLOBIN DISSOCIATION Final Report, Mar.–Sep. 1966
William H. Pryor, Harold L. Bitter, and Raymond J. Bertler Apr. 1967 13 p refs
(SAM-TR-67-33; AD-655595)

Twelve dogs were exposed to 180 p.p.m. nitrogen dioxide-nitrogen tetroxide until death occurred. Oxyhemoglobin dissociation curves were plotted on each subject before and after exposure. Percent saturation was thus used as a measure of ability to transport oxygen. It was determined that NO_2/N_2O_4 exposure reduced the oxygen-carrying capacity of hemoglobin by 10% to 15% throughout the physiologic range. There was a rise in methemoglobin concentration that was not sufficient to account for the shift in the oxyhemoglobin dissociation curve, despite its being

statistically significant. Although chronic exposures were not a part of this study, it is suggested that a similar reduction in hemoglobin function could result from long-term inhalation of air polluted with these gases. Author (TAB)

N67-37000*# Technology Inc., San Antonio, Tex. Life Sciences Div.
INVESTIGATION OF STRENGTH OF ISOLATED VERTEBRAE, PHASE IV Final Technical Report, 29 Oct. 1965–28 Oct. 1966
Jeremy F. Crocker and Lawrence S. Higgins 28 Oct. 1966 30 p refs
(Contract NASw-1313)
(NASA-CR-88610; TI-1313-66-4) CFSTI: HC $3.00/MF $0.65 CSCL 06P

This report summarizes research conducted on isolated human vertebrae during the year 1965–1966. The dynamic strength of specimens from portions of two human spines was determined. Relative dynamic strengths of centra versus intervertebral discs were measured. The results are presented as a series of graphs which compare experimental values with those found in the literature. Author

N67-37005# Naval School of Aviation Medicine, Pensacola, Fla.
AIRSICKNESS AND ANXIETY
Gary J. Tucker and Roger F. Reinhardt Dec. 1966 24 p refs
(NAMI-988; AD-655633)

The report explores the relation of airsickness experienced early in flight training to anxiety, attrition rates, and the instructor-student interaction. During a two-month period, all students undergoing primary flight instruction (N = 141) filled out a detailed questionnaire immediately after their fifth flight. Seventy-two of these students, randomly selected, were studied more intensively, in that: (1) their flight instructor also filled out a questionnaire after the fifth flight, and (2) this group was surveyed again at the completion of primary training. The airsick group differed significantly from the nonairsick in the following subjective areas: (1) more nervousness, (2) more autonomic symptoms, (3) lower motivation, and (4) finding instructors less likable. The airsick group tended to have a higher attrition rate, and still experienced more anxiety at the completion of primary training. The data represent the first large scale correlation of airsickness in early flight training with subjective anxiety, and, as such, present many theoretical and practical implications. Author (TAB)

N67-37029*# Louisville Univ., Ky.
A CODE TRANSFORMATION TASK THAT PROVIDES PERFORMANCE MEASURES OF NONVERBAL MEDIATION (COTRAN)
Earl A. Alluisi and Glynn D. Coates Washington, NASA, Sep. 1967 43 p refs
(Grant NGR-18-002-008)
(NASA-CR-895) CFSTI: HC $3.00/MF $0.65 CSCL 05H

A code-transformation (COTRAN) task has been designed to follow the model of the problem-solving paradigm. The task is intended to provide performance measures of that part of intellectual functioning which is typically called "nonverbal mediation." In the first experiment, 90 subjects worked at the COTRAN task under one of a set of six conditions which represented the factorial combination of two memory-aid and three transformation-complexity conditions. Seventy-two measures of COTRAN performance were factor analyzed, and five COTRAN factors were identified. Nine measures were selected to represent the five factors, and with these measures it was found that performance with two memory aids was better than with one. The factorial structure was the same under the two conditions. In the second experiment, 84 subjects each completed 18 COTRAN problems as well as a set of paper-and-pencil tests of intellectual abilities and personality. A factor analysis of the 75 measures used resulted in the identification of five COTRAN factors (the same as in the first experiment) and three additional factors—one for verbal intelligence, and two for personality characteristics. Author

N67-37030*# Whirlpool Corp., St. Joseph, Mich.
INVESTIGATION OF THE FEASIBILITY OF WET OXIDATION FOR SPACECRAFT WASTE TREATMENT
Robert B. Wheaton, J. R. Calloway Brown, Ruben V. Ramirez, and Norman G. Roth [1966] 43 p refs
(Contract NAS1-6295)
(NASA-CR-66450; Rept.-66450) CSCL 06K

Laboratory studies were made to determine the feasibility of adapting the principle of high temperature, high pressure, wet oxidation to the reclamation of water and the disposition of organic waste residues on board space vehicles. The process assures the balance of the water cycle and is a possible first step in the conversion of waste materials into reusable forms. The tests were conducted in a one liter oxidation chamber using pure oxygen. The effects of oxidation temperature, catalysts, influent concentration, stirring, and similar variables were studied during the wet oxidation of a variety of waste materials. Author

N67-37045# Michigan Univ., Ann Arbor. Dept. of Psychology.
CHOICE REACTION TIME: AN ANALYSIS OF THE MAJOR THEORETICAL POSITIONS
Edward E. Smith Jan. 1967 90 p refs
(Contract AF 49(638)-1235)
(AFOSR-67-1804; TR-6; AD-656713)

The report analyzes and evaluates (against experimental findings) contemporary theories of choice reaction time (CRT). The influence of Donders subtraction method on current theory is assessed, followed by a review of experimental findings concerned with the effects on CRT of: (1) number of alternatives, (2) stimulus probability, (3) stimulus value, (4) repetition of stimulus or response, (5) stimulus discriminability, (6) stimulus-response compatibility, (7) practice, and (8) emphasis on speed versus accuracy. A three-state conceptualization of the central mechanisms operative during the latent period--stimulus preprocessing, stimulus categorization, and response selection--is proposed. The theories are dichotomized on the basis of the process-template matching versus feature testing--which is assumed to underlie stimulus categorization. The analysis indicates that current theories have neglected response selection processes and are consequently unable to account for several experimental findings. A final section deals with the relation of CRT theories to perceptual recognition theories. Author (TAB)

N67-37077# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
INTEGRATED LIFE SUPPORT SYSTEM STUDY (20-DAY EVALUATION PROGRAM) Final Report, Apr.–Dec. 1965
Courtney A. Metzger and Eugene Fritz Dec. 1966 76 p refs
(AMRL-TR-66-185; AD-656311)

Tests were conducted to define the various problems involved in the maintenance of an acceptable environment, the number of variables concerned with the man-machine concept, the operation, maintenance and evaluation of single units and integrated systems for the support of life in a simulated aerospace mission. The investigation covered primary problems and benefits associated with water recovery, personal hygiene, sanitation, nutrition, instrumentation, atmospheric conditions at various pressures and mixtures, clothing, crew accommodations, waste management and muscle-strength while confined in a chamber simulating an aerospace vehicle, and the facilities and support required to test and evaluate life support systems. Author (TAB)

N67-37090# Army Aeromedical Research Unit, Fort Rucker, Ala.
SOUND ATTENUATION CHARACTERISTICS OF THE NAVY SPH-3 (MODIFIED) (LS) HELMET
Robert T. Camp, Jr. and Robert L. Keiser May 1967 25 p
(USAARU-67-8; AD-656748)

An evaluation of the real-ear sound attenuation characteristics of the Navy SPH-3 (Modified) (LS) Helmet was done with procedures and equipment specified by ASA Z24.22 - 1957. The results show that the SPH-3 (Modified) (LS) is a relatively efficient attenuator of sound throughout the audio spectrum. In view of the poor sound attenuation characteristics of the Army APH-5, it has been recommended that this helmet be replaced by the SPH-3 (Modified) (LS). Author (TAB)

N67-37113*# Mayo Clinic, Rochester, Minn.
STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS Semiannual Status Report
Earl H. Wood 10 Aug. 1967 19 p refs
(Grant NsG-327)
(NASA-CR-88529) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Progress is reported on projects dealing with the effects of gravitational and inertial forces on intrathoracic pressure relationships in chimpanzees, regional effects of gravitational and inertial forces on pulmonary arterial-venous shunting, effects of gravitational and inertial forces on regional distribution of pulmonary blood flow, regional effects of the head-up and head-down positions on intrapleural and circulatory pressures and pulmonary blood flow, the nature of the pleural space, the development of biplane roentgen videodensitometry, the development of time shared on-line and real time electronic data processing and computer techniques, techniques for beat-to-beat determination of end-diastolic left ventricular pressures in dogs during different circulatory states, mitral valve function studies using roentgen videodensitometry, effects of selective acute sympathetic and/or parasympathetic cardiac denervation on left ventricular function, the determination of circulating total blood volume from indicator dilution curves, and a closed loop search technique for finding the optimum atrial–ventricular stimulus interval under different hemodynamic conditions. R.N.A.

N67-37214 Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
REVIEW OF MEDICAL PROBLEMS ENCOUNTERED IN DEEP SEA DIVING [OVERZICHT VAN DE MEDISCHE PROBLEMEN, DIE ZICH VOORDOEN BIJ HET DUIKEN OP GROTE DIEPTE]
E. Meeter Jun. 1967 23 p refs In DUTCH; ENGLISH summary
(MBL-1967-6; TDCK-48781)

The dangers during a prolonged stay at great depth, such as oxygen intoxication, inert gas narcosis, and carbon dioxide intoxication, are reviewed. Pathological phenomena seen after return to the normal environment are discussed. Attention is drawn to the differences in clinical signs which may occur, their patho-physiological background, and the consequences for therapy. Author

N67-37246# Tokyo Univ. (Japan). School of Medicine.
EFFECT OF HIGH ALTITUDE TO HEMATOPOIETIC PROCESS
Kazuo Asahina San Francisco, Army Res. and Develop. Group (Far East), May 1967 41 p
(Contract DA-92-557-FEC-37964)
(J-234-4; FR-2; AD-656529)

Changes in stroke volume of the right and left heart were studied in relation to tolerance to altitude. It was concluded that the pulmonary circulation might be regarded as a limiting factor of importance for performance at altitude. Chronic experiments on rabbits with chronic implanted heart electrodes were performed with partial success. The animals can be kept alive about one month after the operation. The results of these chronic experiments showed that the contractile capacity of the right heart is strengthened, increasing the right heart stroke volume within one week period of training-exposure to hypoxic condition. This fact supports the view that the improvement of the right heart capacity might be involved in the establishment of acclimatization to altitude. Changes in ascorbic acid in different organs at altitude are being studied in order to elucidate the role of this substance in acclimatization or tolerance to altitude. The results obtained so far show that the well acclimatized or tolerant animals have a larger capacity for utilizing ascorbic acid at altitude than do unacclimatized or less tolerant animals. This suggests that the administration of large amount of ascorbic acid may improve the tolerance to hypoxia. Author (TAB)

N67-37251# Rock Island Arsenal Lab., Ill. Research and Engineering Div.
MICROBIAL-METAL CORROSION—LITERATURE REPORT
Van Y. S. Hong Feb. 1967 33 p refs
(RIA-67-534; AD-655274)

The importance of microorganisms in the corrosion process was illustrated as related to their broad distribution in nature and their longevity of existence on earth. A limited literature survey was made in the five areas of Microbial Corrosion. These areas are: historical background, mechanisms of microbial corrosion, microorganisms and the metals and alloys they attack, preventive measures to counteract this corrosion, and examples of microbial corrosion in military equipment. A brief discussion of each area was made, and also a future research program was suggested in resolving some of the problems found in these areas. TAB

N67-37271# Naval Training Device Center, Orlando, Fla.
VIGILANCE PERFORMANCE AND PHYSIOLOGICAL RESPONSES UNDER FIXED AND VARIABLE SIGNAL SCHEDULES
John L. Andreassi, Salvatore C. Rapisardi, and Patricia M. Whalen May 1967 45 p refs
(NAVTRADEVCEN-IH-71; AD-655619)

The investigation was designed to: (1) determine the effects of signal patterning upon physiological responses and RT to the signals; and (2) provide some information with respect to the roles of expectancy and arousal in monitoring performance. Monitoring performance and physiological responses with variable interval (VI) and fixed interval (FI) signal patterns were studied in four Ss over an average of 10 days each. The Ss were required to expend some effort in order to obtain the critical signals. Reaction time (RT) was used as the performance measure while heart rate (HR), palmar skin conductance (PSC) and galvanic skin responses (GSRs) were the physiological measures. The RTs were significantly faster under the FI schedule than with VI. The PSC and GSR measures were significantly higher under FI than with VI, while HR was significantly greater with VI as compared to FI. Cumulative records showed typical response patterning to FI and VI schedules for three or four Ss. On the basis of these results it was suggested that: (1) faster RTs under the FI schedule reflect greater learning of the signal pattern under the FI schedule and perhaps the existence of an internal timing mechanism; (2) signal patterning does have an effect on physiological response and RT; (3) the difference between conductance phenomena and heart responses to the two signal patterns may be due to differential responsivity of the autonomic nervous system; (4) monitoring performance contains elements of both expectancy and arousal. Author (TAB)

N67-37320*# Douglas Aircraft Co., Inc., Santa Monica, Calif.
ENGINEERING CRITERIA FOR SPACECRAFT CABIN ATMOSPHERE SELECTION

M. S. Bonura and W. G. Nelson Washington, NASA, Sep. 1967 300 p refs
(Contract NASw-1371)
(NASA-CR-891) CFSTI: HC $3.00/MF $0.65 CSCL 06K

Test results and analytical data are presented to show the effects of atmosphere selection on life support system design. These indicate: (1) Comfort zones are 5° to 7°F higher in helium–oxygen atmospheres than in nitrogen–oxygen. (2) Normal space cabin leakage involves a higher weight flow rate when nitrogen is the diluent. (3) In evaluating the airlock penalty, a pump-down system for atmosphere conservation is considered advantageous if used more than three to six times a mission. (3) Heat exchangers, condensers, and absorption beds will require approximately equal weight and power for equal heat loads and operating temperatures. (4) Experimental data were applied to an example problem for a three-man orbital laboratory. Findings show that a weight and power savings can be obtained by using helium as a diluent. (5) Ignition and combustion phenomena of cotton cloth, a single insulated wire, and wide bundles were assessed under various typical atmospheres. In general, increasing diluent concentration results in decreased burning rates, while increased oxygen partial pressure decreases ignition temperature. Author

N67-37353*# Scientific Translation Service, La Canada, Calif.
THE EFFECT OF VIBRATION AND NOISE ON THE MENTAL FACULTY OF MAN UNDER TIME STRESS [VLIYANIYE VIBRATSIY I SHUMA NA UMSTVEMUYU RABOTOSPOSOBNOST' CHELOVEKA V USLOVIYAKH DEFITSITA VREMENI]
K. K. Ioseliani Washington, NASA, Jul. 1967 6 p refs Transl. into ENGLISH from Kosmich. Biol. i Med. (USSR), v. 1, no. 2, 1967 p 79–82
(Contract NASw-1496)
(NASA-TT-F-11142) CFSTI: HC $3.00/MF $0.65 CSCL 05F

Sixty examinees in the age group of 25 to 45 years were studied. Prior to, during, and upon termination of vibration treatments, the examinees performed addition and substraction operations on numbers presented at varying speeds. Investigations demonstrated that the influence of total vertical vibrations, at a frequency of 70 cycles per second and an amplitude of 0.4 mm, reduces by as much as 1.5 to 2 times the qualitative accomplishment of the experimental task. The effect of noise at 90 decibels normally cuts the qualitative accomplishment of the task in half. The greater the time stress, the greater is the reduction of mental efficiency. Author

N67-37356# Los Alamos Scientific Lab., N. Mex.
A PERSONNEL RADIO-FREQUENCY RADIATION MONITOR
Frederic L. Fey, Jr. 12 Jul. 1967 5 p ref
(Contract W-7405-ENG-36)
(LA-3722) CFSTI: HC $3.00/MF $0.65

A personnel radio frequency radiation monitor was developed which indicates exposure to significant rf radiation by an audible chirp. The chirp rate is proportional to the power flux level down to an adjustable threshold which may be set as low as 0.1 mW/cm^2. When this monitor is worn by a person, the threshold could be set at 10 mW/cm^2 to conform with the working level suggested by the American Standards Association. The rf monitor circuit is composed of inexpensive and readily available components contained in a case the size of a cigarette package, yet it is stable and reliable. At a low chirp rate, it can operate continuously for 1 month on a small 4.2-volt mercury battery. This monitor would be valuable in guarding against overexposure and injury of personnel working in facilities where there are high power sources of rf energy, such as radio transmitters, particle accelerators, and radar installations. Author (NSA

N67-37389# Duke Univ., Durham, N. C. Medical Center.
CARDIOPULMONARY EFFECTS OF PRESSURE BREATHING DURING HYPOTHERMIA Final Report
John Salzano and F. G. Hall Wright-Patterson AFB, Ohio, AMRL, Apr. 1967 22 p refs
(Contract AF 33(657)-8854)
(AMRL-TR-66-184; AD-655935)

Continuous pressure breathing was studied in hypothermic anesthetized dogs. Alveolar ventilation decreased during continuous positive pressure breathing (CPPB) and increased during continuous negative pressure breathing (CNPB). The changes in alveolar ventilation were due to changes in respiratory rate as well as in respiratory dead space. Cardiac output fell significantly during CPPB due to a reduction in heart rate and stroke volume. During CNPB cardiac output was only slightly greater than during control as a result of a fall in heart rate and an increase in stroke volume. Oxygen consumption was reduced to 60% of control during CPPB of 16 cm H2O, but was 25% greater than control during CNPB. Qualitatively, CO2 production changed as did O2 consumption, but was different quantitatively during CNPB, indicating hyperventilation due to increased respiratory rate. Mean pulmonary artery pressures and pulmonary resistance varied directly with the applied intratracheal pressure. The results indicate that the hypothermic animal can tolerate an imposed stress such as CPPB and can increase its O2 consumption during CNPB as does the normothermic animal. Author (TAB)

N67-37391# Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
INVESTIGATION OF AN INTEGRATED CARBON DIOXIDE-REDUCTION AND WATER-ELECTROLYSIS SYSTEM Final Report, 1 Jan.–30 Jun. 1966
John E. Clifford, Edwin S. Kolic, Edward W. Winter, Robert H. Cherry, and Eugene J. Mezey Wright-Patterson AFB, Ohio, AMRL, Apr. 1967 74 p refs
(Contract AF 33(615)-2288)
(AMRL-TDR-66-186; AD-655937)

A new integrated system for oxygen recovery from carbon dioxide was investigated. Experimental studies indicated that it was feasible to integrate water electrolysis with carbon dioxide hydrogenation in an electrolysis cell using PD-25AG hydrogen-diffusion cathodes containing Sabatier catalyst. A closed system producing carbon appeared feasible from experiments on catalytic methane cracking followed by hydrogen separation from unreacted methane in an electrolytic hydrogen-concentration cell using PD-25AG electrodes. A small experimental breadboard system was designed and constructed. Author (TAB)

N67-37413 Institute for Perception RVO-TNO, Soesterberg (Netherlands).
EFFECTS OF HIGH-INTENSITY NOISE LEVELS ON THE HUMAN BODY [DE INVLOED VAN HOGE LAWAAINIVEAUS OP HET MENSELIJK LICHAAM]
L. C. W. Pols Mar. 1967 25 p refs In DUTCH; ENGLISH summary
(A66/KLu/039; IZF-1967-13; TDCK-48670)

A discussion is given, based on a number of publications, on the nonauditory influence of high-intensity noise levels on humans. The influence of low frequency mechanical vibrations is included in this study. Suggestions are made for maximum tolerable levels so far as the present data permit. Author

N67-37428*# National Aeronautics and Space Administration, Washington, D. C.
NYCTOMETRIC STUDIES AND THE EFFECT OF VESTIBULAR EXCITATION ON THE DARK ADAPTATION [NIKTOMETRIYA PRI IZUCHENII VLIYANIYA VESTIBULYARNOGO RAZDRAZHENIYA NA TEMNOVUYU ADAPTATSIYU]

T. A. Petrova, M. P. Kuzmin, I. Ya. Yakovleva, and V. P. Baranova Aug. 1967 7 p refs Transl. into ENGLISH from Kosmicheskaya Biol. i Meditsina (USSR), v. 1, no. 2, 1967 p 82–86
(NASA-TT-F-11143) CSCL 06P

The dark adaptation of the eye before and after excitation of the vestibular analyzer was studied on 50 healthy test subjects by the nyctometric method (the apparatus was calibrated for 100 people). The test OR_{10} was used as a vestibular stimulus. Changes in the rate of the dark adaptation were established with respect to the vestibular tolerance; high tolerance accelerated dark adaptation and low tolerance decelerated it. The possibility of specific interaction of the vestibular and optic analyzers was shown. Author

N67-37438# Michigan Univ., Ann Arbor. Dept. of Psychology.
HUMAN PERFORMANCE IN CONTINGENT INFORMATION PROCESSING TASKS
Irving Biederman (Ph.D. Thesis) Oct. 1966 110 p refs Sponsored by ARPA
(Contract AF 49(638)-1235)
(AFOSR-67-1801; TR-3; AD-656712)

Theoretical accounts of complex human information processing behavior have emphasized the utilization of contingencies whereby the processing of some information directs the processing requirements of the remaining sources of uncertainty. The manner in which such contingencies are processed, however, has received little empirical study. The present investigation examined the effects of discriminability and S-R compatibility on the speed and accuracy of response in tasks in which the relevancy of a given stimulus dimension was contingent upon the value of the stimulus on some other dimension. It was concluded that contingencies are utilized by the subject to select dimensions to process. Further, these contingencies are utilized at some stage prior to that involved in the selection of responses. RTs to a repeated stimulus were faster than RTs to a different stimulus. The magnitude of these repetition effects varied as a function of the discriminability of the dimension that changed value, its relevancy, and its structural status. Author (TAB)

N67-37439# Michigan Univ., Ann Arbor. Engineering Psychology Lab.
CONSERVATIVE INFERENCE WITH SIMPLE AND DIFFUSE HYPOTHESES Final Report
Ward Edwards Aug. 1967 9 p
(Contract AF 49(638)-1731)
(Rept.-08024-7-F; AFOSR-67-1877; AD-656781)

A large number of experiments have evaluated the manner in which men make inferences about hypotheses on the basis of fallible data. The most important conclusion of these experiments is that man is a conservative information processor, unable to extract as much information as is latent in the data. The research reported further investigates the phenomena of conservative information processing. Author (TAB)

N67-37450*# Southwest Research Inst., San Antonio, Tex.
SOUTHWEST RESEARCH INSTITUTE ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Quarterly Progress Report, 1 Jun.–31 Aug. 1967
Ray W. Ware and Louis S. Berger 19 Sep. 1967 105 p refs
(Contract NASr-94; SwRI Proj. 14-1963)
(NASA-CR-88469; QPR-4) CSCL 06B

Methods are being developed to effectively transfer the maximum amount of applicable aerospace technology to the fields of medicine and biology. Information pertaining to each biomedical problem submitted is organized and maintained in the form of a case history. This report contains a list of submitted biomedical problems, summaries of individual problem case histories, a few problem abstracts accepted, a tabulation of documents furnished to problem originators, and a listing of problems with technology transfers accomplished, transfers in progress, and applicable technology identified. R.N.A.

N67-37462# RAND Corp., Santa Monica, Calif.
A MATHEMATICAL MODEL FOR POST-IRRADIATION HEMATOPOIETIC RECOVERY
J. P. Okunewick and A. L. Kretchmar (Tenn. Univ., Knoxville) Jul. 1967 40 p refs Prepared jointly with Oak Ridge Inst. of Nucl. Studies
(Contracts F44620-67-C-0045; AT(40-1)-GEN-33; Proj. RAND)
(RM-5272-PR; AD-655345)

A mathematical model is presented of the recovery after irradiation of the system producing blood cells in the body. The model is based on the hypothesis that hematopoietic stem cells, which are unable to reproduce as stem cells following irradiation, may still retain an ability to differentiate. The model demonstrates both an abortive recovery rise and a true recovery rise following irradiation. As a first approximation, the model shows no irreconcilable differences from experimental data and generally represents the phenomena observed in the recovery of erythropoiesis following acute irradiation. In addition, certain postulates basic to blood-cell development are derived. Author (TAB)

N67-37476*# Scientific Translation Service, La Canada, Calif.
THE EFFECTS OF LOW SALT CONCENTRATION UPON MARINE ORGANISMS [UBER DIE EINWIRKUNG NIEDERER SALZKONZENTRATIONEN AUF MARINE ORGANISMEN]
Carl Schlieper Washington, NASA, Sep. 1967 34 p refs Transl. into ENGLISH from Z. Vergleich. Physiol. (Berlin), v. 9, 1929 p 478–514
(Contract NASw-1496)
(NASA-TT-F-11226) CSCL 06C

Effects of salt concentration on nereis diversicolor, carcinus maenus, and mytilus edulis were investigated. Body surface permeability of marine animals is discussed. Author

N67-37493* Schwarz Bioresearch, Inc., Orangeburg, N. Y.
SUPERIOR DIET FOR MAN IN SPACE Annual Report, Oct. 1963–Oct. 1964
Norman A. Rosenthal Oct. 1964 128 p refs
(Contract NASw-517)
(NASA-CR-88617) CSCL 06H

Liquid diets were examined biologically from the standpoint of their ability to provide both the nutritional imperatives as well as nutritional electives in terms of their respective individual components. Evaluations of the role of concentration of various diet constituents, with particular regard to water content and amino acid pattern, were also made. Explorations of the factors contributing to the nutritional adequacy and diet stability of liquid diets were undertaken as well. Author

N67-37509*# Pennsylvania State Univ., University Park. Physiology Labs.
VASCULAR RESPONSES AND WOUND REPAIR IN MICE EXPOSED TO MODERATE AND SEVERE HYPOXIA
Diana R. Godish and Adam Anthony Sep. 1967 75 p refs
(Grants NGR-39-009-015(2); PHS GM-05112)
(NASA-CR-88517) CFSTI: HC $3.00/MF $0.65 CSCL 06C

Adult male A/HeJ mice were exposed to moderate (380 mm Hg) or severe (320 mm Hg) hypoxia for 7 to 40 days. The extent of peripheral angiogenesis was determined from weakly stereoscopic drawings of ear vasculatures in hypoxic and control mice; vascular proliferation was also microscopically observed in visceral tissues. Healing of peripheral wounds (ear puncture) was expressed as percentage of puncture filled with granulation

tissue; internal body wound healing was studied histologically and histochemically. Supplemental information on vascular changes and wound repair was obtained from microscopic analysis of 6–8 μ sections. Data on hematocrit and body and organ weight changes were also recorded. A total of 234 animals was used. It was concluded that hypoxia exposure triggers a shift in blood distribution such that internal body tissues receive more blood while peripheral regions are supplied with only minimal amounts; another important effect of hypoxia is the stimulation of angiogenesis, first in the visceral tissues and later in peripheral regions. Author

N67-37546# General Electric Co., Schenectady, N. Y. Research and Development Center.
IMMOBILIZED LIQUID MEMBRANES FOR CONTINUOUS CARBON DIOXIDE REMOVAL Final Report, 24 May 1965–1 Sep. 1966
W. J. Ward, III Wright-Patterson AFB, Ohio, AMRL, Jun. 1967 49 p refs
(Contract AF 33(615)-2957)
(S-67-1076; AMRL-TR-67-53; AD-656785)

The objective of the program was the development of an immobilized liquid membrane for CO2 removal from a manned spacecraft. During basic film research, water was found to be better than a polymeric material or any pure liquid for CO2/O2 separation. An immobilized film of water was available in the form of a porous cellulose acetate membrane. By impregnating this membrane with a concentrated solution of CsHCO3/Cs2CO3, and a catalyst for the hydrolysis of CO2, CO2 transport was facilitated and O2 transport was decreased to obtain a CO2/O2 separation factor and CO2 permeability of 4100 and 55, 796 x 10 to the -9th power. A mathematical analysis of CO2 transport was also carried out. It will now be possible to build a single-stage CO2 removal system with minimum power, weight, and size requirements Author (TAB

N67-37557# RAND Corp., Santa Monica, Calif.
A BIBLIOGRAPHY ON NERVE CONDUCTION AND NERVE IMPULSES
Elizabeth McKeldin, Lois Newman, and Judith Wallach Jul. 1967 31 p refs *Its* Lit. Search No. 127
(P-3613; AD-654637)

The bibliography is concerned with the behavior of networks of nerve cells. Emphasis is placed on waves of nerve impulses passing through masses of nerve tissue, excluding brain waves (EEG). The bibliography does not include items dealing with automata or bionic devices; it does include items on the theory and simulations that apply very closely to the behavior of real (i.e., living) nervous tissue and networks. Author (TAB)

N67-37558# General Dynamics/Electronics, Rochester, N. Y.
COMMUNICATION AND INFORMATION THEORY ASPECTS OF THE NERVOUS SYSTEM Final Report, 1 Oct. 1964–30 Sep. 1966
Eugene Agalides Mar. 1967 86 p refs
(Contract AF 49(638)-1470)
(AFOSR-67-1522; AD-654629)

Transmission of information in living organisms is conveyed through the nervous system. It was proved that this information is transmitted in coded form; either as a unichannel–multicoding or a multichannel–multicoding system, skin sensory receptors, such as the Pacinian corpuscle and the Lorenzini ampulla, were used in the experiments. It was found that different types of stimuli would elicit different types of coded signals. Acoustic stimuli reaching a high amplitude level were found to stimulate not only the organism's auditory system but also its skin sensory system thereby reinforcing the general stimulation of the nervous system. Furthermore, it was found that if these high amplitude stimuli are extended over a long period of time—days, weeks, or months, depending on the stimulus—then such high amplitude stimuli become obnoxious to the organism, affecting different organs and impairing their proper functioning. Author (TAB)

N67-37565# Michigan Univ., Ann Arbor. Dept. of Psychology.
HUMAN PERFORMANCE IN INFORMATION PROCESSING AND STORAGE Final Report
Arthur W. Melton Jul. 1967 72 p refs
(Contract AF 49(638)-1235; ARPA Order 461)
(AFOSR-67-1874; AD-656709)

Research was conducted in the general field of Engineering Psychology, and specifically on human performance. This research is designed to produce a taxonomy of human information-processing functions, to determine human capabilities and limitations in fulfilling basic information-processing functions, to develop a model of human short-term memory in the interest of advancing basic knowledge of human information processes. TAB

N67-37569# Space-General Corp., Los Angeles, Calif. Center for Research and Education.
ELECTROCHEMICALLY ACTIVE, FIELD-TRAINABLE PATTERN RECOGNITION SYSTEMS Final Report, 1 Feb. 1966–30 Apr. 1967
R. M. Stewart, J. R. Milne, G. I. Hickey, and C. E. Hendrix Apr. 1967 84 p refs *Its* Res. on Adaptive Devices
(Contract Nonr-4416(00))
(SGC-485/FR-3; AD-655650) CFSTI: HC $3.00/MF $0.65

Research was directed toward the development of a new class of pattern recognition equipment for rapid and automatic detection and/or classification of spatio-temporal patterns. One restricted but key class of systems was emphasized--functionally, adaptable linear decision functions; structurally, a homogeneous array of gold/iron dipoles in nitric acid which feed, in parallel, a low-impedance detector circuit--and means for direct excitation of such arrays by patterns of incident light. Theory shows that such a system (and some others) can be trained through the agency of diffuse or global electrical shocks applied across the whole array immediately following each improper response in a training sequence and, thus, avoid the conventional requirements for detailed access, connecting, or internal structuring and programming. During this process the size and structure (and, hence, function) of the dendrites is gradually altered in excited regions through differential dendritic electrodeposition and dissolution. When perfected and extended, this type of bulk process and others like it should lead to pattern recognition machines reaching entirely new levels of packing density and versatility. Additional design data was acquired through a number of basic experiments and completed an experimental sixteen-element Linear Field-Trainable (LIFT) array was completed together with compatible pattern input, control, and monitoring equipment. TAB

N67-37578# Naval School of Aviation Medicine, Pensacola, Fla.
PSYCHOMOTOR FUNCTIONS, THE BODY IMAGE, AND AVIATION
Gary L. Tucker and Roger F. Reinhardt 8 Dec. 1966 23 p refs
(NAMI-986; AD-655434) CFSTI: HC $3.00/MF $0.65

In the evaluation of aviators, and particularly student aviators, another source of anxiety -- unrelated to fears of death and mutilation, etc. -- has become evident. This is in the sphere of psychomotor adaption to the process of flying an airplane. In this report, a theoretical formulation of the process of learning to fly is presented in terms of the aviators psychomotor function, body image, and ability to orient himself in space. Clinical and experimental evidence are presented to validate these theories. Author (TAB)

N67-37591*# Miami Valley Hospital, Dayton, Ohio.
THE BIOCHEMICAL, PHYSIOLOGICAL, AND METABOLIC EVALUATION OF HUMAN SUBJECTS IN A LIFE SUPPORT SYSTEMS EVALUATOR AND ON A DIET OF PRECOOKED FREEZE DEHYDRATED FOODS Final Report, 12 Oct.–24 Nov. 1964

Bernard J. Katchman, George M. Homer, James P. F. Murphy, and Dorathea P. Dunco Wright-Patterson AFB, Ohio, AMRL, Jul. 1967 55 p refs
(NASA Order R-85; Contract AF 33(657)-11716)
(NASA-CR-88635; AMRL-TR-67-12) CFSTI: HC $3.00/MF $0.65 CSCL 06S

A 6-week study was conducted for the purpose of evaluating the water, caloric, and protein requirements of individuals undergoing stresses imposed by simulated aerospace conditions. The subjects were confined in a controlled activity facility for 2 weeks and in the Life Support Systems Evaluator for 4 weeks during which time they wore an unpressurized MA-10 pressure suit 8 hours each day for 14 consecutive days. A 3-day cycle diet of precooked freeze dehydrated foods was served at room temperature and was comprised of about 105 g of protein, 328 g of carbohydrate, 89 g of fat, and 2600 kcal per day. The daily requirement of water was 2200 ml per man day of which 700 ml were consumed ad libitum. The diet was highly acceptable and efficiently utilized. Only minimal body weight changes were observed. The nutrient intake of the diet was adequate in that a 70 kg man was maintained without any weight loss. Metabolic balances show excellent adjustment to the diet; all subjects were in positive balance for nitrogen and for the major inorganic constituents. All the clinical data including heart rate, blood pressure, and oral temperature were in the normal ranges and no significant differences were observed due to confinement in the Life Support Systems Evaluator. Author

N67-37599# Life Sciences, Inc., Fort Worth, Tex.
PILOT PERFORMANCE, TRANSFER OF TRAINING AND DEGREE OF SIMULATION. II. VARIATIONS IN AERODYNAMIC COEFFICIENTS
N. C. Ellis, A. L. Lowes, W. G. Matheny, D. A. Norman, and L. E. Wilkerson Orlando, Fla., Naval Training Device Center, May 1967 115 p refs
(Contract N61339-1889)
(NAVTRADEVCEN-1889-1; AD-655837)

Transfer of training studies were conducted to determine the training feasibility of simulations reduced by varying aerodynamic coefficients in two ways, rigid coefficients and least squares approximations to the coefficients. Experiment One incorporated the coefficient changes in the longitudinal mode; Experiment Two in the lateral mode; and Experiment Three in the combined longitudinal and lateral modes. On the basis of study results, it was concluded that feasibility of these reduced simulations as conditions for training was demonstrated. Author (TAB)

N67-37620*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY WITH INDEXES, JULY 1967
Aug. 1967 167 p refs
(NASA-SP-7011(40)) CFSTI: HC $3.00/MF $0.65 CSCL 06S

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during the following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry consists of a standard citation accompanied by its abstract. Author

N67-37622*# IIT Research Inst., Chicago, Ill.
RESEARCH ON OXYGEN TOXICITY AT THE CELLULAR LEVEL Final Report, 15 Apr. 1965–15 Jun. 1966
Willis H. Riesen, James Q. Kissane, Raymond W. Bieber, Merl L. Kardatzke, Harold P. Kaplan (AMRL) et al Wright-Patterson AFB, Ohio, AMRL, Dec. 1966 82 p refs
(NASA Order R-87; Contract AF 33(615)-2164)
(NASA-CR-88545; IITRI-L6027-13; AMRL-TR-66-206) CFSTI: HC $3.00/MF $0.65 CSCL 06T

The use of pure oxygen atmospheres at reduced pressure in manned spacecraft has stimulated new research interest. Exposure of humans to pure oxygen at total pressures of 5 to 7 psia for up to 30 days has generally produced only subjective and occasional symptomatic distress. Nevertheless, studies with animals have clearly documented toxicity if the exposure to pure oxygen is at higher total pressures. The selection of suitable oxygen atmospheres for manned space flight and the development of protective measures against toxic manifestations will be considerably facilitated by a clearer understanding of the toxic syndrome. Rats, dogs, and monkeys were exposed to pure (98.5%) oxygen at 1 atm and 1/3 atm in a closed, recirculating chamber and in a nonrecirculating chamber. Rats exposed at a pressure of 1 atm showed significant reduction in efficiency of liver mitochondrial oxidative phosphorylation. Weight loss accompanied this change. Insignificant changes were found in liver or lung mitochondrial oxygen consumption; liver or lung NAD, NADH, or NAD/NADH; and arterial blood lactate and pyruvate, and lactate/pyruvate ratio. A composite index of oxygen toxicity was derived from a multivariant data analysis. Exposure of rats to pure oxygen at 1/3 atm showed slight elevation in P/O ratio in 7 days. The ratio returned to normal in 2 weeks and remained so for 8 months. No significant weight changes were observed. Only preliminary experiments with the dogs and monkeys were conducted. There is an indication that monkeys are more resistant to oxygen toxicity at 1 atm than rats. Author

N67-37627* National Aeronautics and Space Administration, Washington, D. C.
COACERVATE DROPS AS A FORM OF CONCENTRATION OF MATTER [KOATSERVATNYYE KAPLI KAK FORMA KONTSENTRIROVANIYA VESHCHESTV]
T. N. Yevreinova Jan. 1967 13 p refs Transl. into ENGLISH from Probl. Evolyutsionnoi i Tekhn. Biokhim., Akad. Nauk SSSR, Inst. Biokhim. (Moscow), 1964 p 118–126
(NASA-TT-F-10610) CSCL 06A

Coacervate drops are considered a form of concentration of molecules in the process of development of life on earth. The degree of concentration of matter in the individual coacervate drops of different chemical composition was determined by optical methods: quantitative interference microscopy and ultraviolet cytospectrophotometry, making it possible to find matter down to 10^{-13} g. The concentration of different substances (protein, nucleic acids, hydrocarbons, lipids) in drops exceeds by tens and hundreds of times the concentration of matter in solutions from which the drops were formed. There are definite quantitative relations between the size of drops and the concentration of matter in them. The smaller the drops, the denser they are. Such ratios occur in some one-celled organisms and in the cells of tissues. The collected data on the content of matter in drops can be used in computing the space required for holding the molecules participating in chemical reactions modeled in coacervate drops. Author

N67-37628*# International Information, Inc., Philadelphia, Pa.
COACERVATES [KOATSERVATY]
T. N. Yevreinova Oct. 1967 34 p refs Transl. into ENGLISH from USP. Sovrem. Biol. (Moscow), v. 37, no. 2, 1954 p 177–201
(Contract NASw-1499)
(NASA-TT-F-10700) CSCL 06A

The author discusses coacervates, mainly those obtained from aqueous colloidal solutions of proteins. The information presented indicates that coacervates can be transformed into a multiple of liquid structures. The role of such liquid coacervate structures in biology is considered. It is shown that, since coacervates can be

formed from the same chemical compounds which participate in the composition of living organisms, some properties of coacervates and living organisms are the same. However, coacervates can be used only as coarse models for a study of the problem of the generation of life. Author

N67-37640* Stanford Research Inst., Menlo Park, Calif.
ULTRASTRUCTURE OF THE GASTRIC MUCOSA OF NORMAL LABORATORY FERRETS
R. J. Stephens and C. J. Pfeiffer [1967] 24 p
(Contract NAS2-3559)
(NASA-CR-73136) CSCL 06C

Essential features of the ultrastructure of the gastric glandular tissue of the normal, fed, and fasted adult ferret are delineated. Data are intended to serve as a baseline for studies of the physiological and pharmacological response of the mammalian gastric mucosa. Cytological features of the surface mucous cell, parietal cell, and chief cell are described. Fine fibrils were seen running from the desmosomes on the lateral surface of surface mucous cells beneath the nucleus and on toward desmosomes on the opposite side of the cell. Mucous granules are produced in the area of the Golgi and evidence is presented that secretion is brought about by solubilization in the apical cytoplasm prior to release through the plasma membrane. Argentaffin cells with microvilli extending into the lumen of the gland were observed. Several micrographs accompany the discussion. S.P.

N67-37654*# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
ADVANCES IN THE USE OF COMPUTERS FOR HANDLING HUMAN FACTORS TASK DATA
Lawrence E. Reed Apr. 1967 16 p refs Submitted for publication
(NASA Order PR-115)
(NASA-CR-88560; AMRL-TR-67-16; AD-656701) CSCL 06B

The purpose of the paper is to review some of the data problems the analyst must deal with in his work and to suggest some possible remedies. A review of the task analysis procedures is followed by a discussion of the uses of task analysis in system development programs. Problems connected with each were used to generate the goals of a research program, which is directed toward the development of computerized techniques to assist the analyst make better use of available data. Author (TAB)

N67-37678* Scientific Translation Service, La Canada, Calif.
CHANGE IN MOVEMENT COORDINATION IN MAN AFTER PROLONGED CONFINEMENT IN A SMALL CHAMBER [IZMENENIYE KOORDINATSII DVIZHENIY CHELOVEKA PRI DLITEL'NOM PREBYVANII YEGO V KAMERE MALOGO OB'YEMA]
B. A. Dushkov Washington, NASA, Jul. 1967 9 p refs Transl. into ENGLISH from Kosmich. Biol. Med. (USSR), v. 1, no. 2, 1967 p 64-70
(Contract NASw-1496)
(NASA-TT-F-11139) CSCL 06S

Biodynamic structures of a complex highly automatized act (walking) and specially chosen movements were studied prior to, during and following 17- and 19-day chamber experiments. Prolonged hypodynamia was shown to disturb the cyclic interaction of structures involved in the motor act and to impair the coordination of biodynamic elements of the neuromotor apparatus in active poses. When developing physical exercises for peculiar conditions, it is recommended to take into consideration the disorders revealed in the human motor coordination (changes of the tempo and rhythm of the activity, physical efforts and pose). Author

N67-37687*# Case Inst. of Tech., Cleveland, Ohio. Digital Systems Lab.
A COMPUTER-AIDED CONTROL TECHNIQUE FOR A REMOTE MANIPULATOR
Jon Terry Beckett 1967 146 p refs
(Grant NsG-728)
(NASA-CR-88483) CFSTI: HC $3.00/MF $0.65 CSCL 05H

A technique for controlling a remote manipulator is investigated which utilizes a general purpose digital computer to assist the operator in performing complex tasks with a minimum of information. An experimental computer-controlled manipulation system is described and several path and positioning control algorithms are presented. One position control algorithm minimizes the manipulator transit time and automatically directs the manipulator around all predefined obstacles. An executive program allows the operator to control the manipulator in the manual mode, to utilize a semi-automatic mode in which commands are entered through a teletype console, or to transfer control to an automatic mode executive routine which reads a series of commands from paper tape and automatically executes them. Author

N67-37707# Naval Medical Research Inst., Bethesda, Md.
THE DEVELOPMENT AND USE OF THE PRIMARY AFFECT SCALE (PAS) Research Report
Eugene Johnson, III, and Thomas I. Myers Jul. 1967 19 p refs
(Rept.-1; AD-655651)

Ten verbal self-report scales were developed to measure subjective affect or feelings in five a priori areas: Happiness, Anger, Fear, Depression, and Arousal. Choice of measurement model, scaling procedures, and use of the scales are discussed. Author (TAB)

N67-37714# Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART XVI: THE LEGIBILITY OF TELETYPEWRITER SYMBOLS ON TELEVISION
G. L. Bell Bedford, Mass., ESD, Apr. 1967 51 p refs
(Contract AF 19(628)-5165)
(MTR-388; ESD-TR-67-104; AD-655356)

The legibility of long Gothic and Murray teletype symbol fonts was studied on television. Subjects identified light symbols on a dark background at four resolutions. The results showed that three special cloud-cover symbols were illegible for all resolutions studied. Under ideal conditions, 10 active lines per symbol height was the minimum recommended resolution for the alphanumeric symbols. The long Gothic and Murray symbols were equally legible. It is recommended that more legible symbols be used for the three cloud-cover conditions. Author (TAB)

N67-37729 Aeronautical Research Council (Gt. Brit.).
THE THERMAL ASSESSMENT OF PERSONAL CONDITIONING GARMENTS
D. R. Burton 1967 42 p refs Supersedes RAE-TR-65263; ARC-28385
(ARC-CP-953; RAE-TR-65263; ARC-28585) HMSO: 7s 6d

This paper discusses the thermal behavior of personal conditioning garments both in theory and practice. A general equation, which is developed for the case of the convective air ventilated suit supplied with cool air, is modified for the cases of the water conditioned suit, and the air ventilated suit with warm dry air supplies. Results of past experiments at the Institute of Aviation Medicine and the Royal Aircraft Establishment are reviewed with the aid of this theoretical approach. It is concluded that there is a need for more systematic experimental data on personal conditioning, especially on convective air cooling. The broad outline of a possible experimental program is discussed. The potential performance of convective, evaporative, and liquid conditioning is predicted; but in view of the scarcity of useful data the results, which are presented in graphical form, are considered to be very tentative. Author

N67-37804# Ohio State Univ., Columbus.
THE EFFECTS OF POSTURE, BREATHING PRESSURE, AND IMMERSION IN WATER ON LUNG VOLUMES AND INTRAPULMONARY PRESSURES Final Report, Jul. 1964–Jun. 1965
Leonard James Thompson (M.S. Thesis), Michael McCally (AMRL, Wright-Patterson AFB, Ohio), and A. S. Hyde (AMRL, Wright-Patterson AFB, Ohio) Wright-Patterson AFB, Ohio, AMRL, May 1967 46 p refs Supported Jointly by AMRL
(Contract AF 33(657)-11698)
(AMRL-TR-66-201; AD-655938)

Lung volumes were measured by spirometry and single breath helium dilution in five subjects under various combinations of posture, breathing pressure, and headout neutral temperature immersion. Tidal volume was unaltered. Vital capacity was reduced significantly only by negative pressure breathing during seated immersion. Seated immersion decreased total lung capacity and functional residual capacity, but the supine posture underwater partially restored these decreases. Positive pressure breathing increased total lung capacity and residual volume for the seated subject in both air and water. A wide range of transthoracic pressure gradients is subjectively more comfortable than a slight increase in the transpharyngeal pressure gradient, suggesting that during immersion, intrapulmonic pressures are selected by the subject to minimize the transpharyngeal pressure gradient. Author (TAB)

N67-37837*# Public Health Service, Phoenix, Ariz. Planetary Louarantine Unit.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, JULY–SEPTEMBER 1967
M. S. Favero 10 Oct. 1967 21 p
(NASA Order R-137)
(NASA-CR-88862; Rept.-10) CSCL 06M

Comparative experiments on the recovery of microorganisms by pork infusion thioglycollate agar (PIT) and trypticase soy agar (TSA) showed that, generally TSA recovered significantly more aerobic and anaerobic sphores than PIT. Tabulated data are presented on the continuing experiments being conducted to determine: (1) the effect of rinse water temperature during storage and prior to heat shock on the recovery of bacterial spores; (2) comparative spore counts of naturally occurring airborne microbial populations on stainless steel strips with cold (4°C) and warm (25°C) peptone water used as the rinse fluid; (3) comparative D_{125C} values for naturally occurring bacterial spores from soil samples; (4) airborne viable particles per 5 cu ft within the Manned Spacecraft Operations Building and within various Apollo areas; (5) microbial contamination accumulating on stainless steel strips exposed within various Apollo areas; and (8) microbial contamination detected on the surfaces of Lunar Orbiter, Surveyor, and IMP spacecraft. M.G.J.

N67-37885*# Scientific Translation Service, La Canada, Calif.
CHANGE IN WATER-SALT METABOLISM DURING 62-DAY HYPOKINESIA [IZMENENIYE VODNO-SOLEVOGO OBMENA V USLOVIY USLOVIYAKH 62-SUTOCHNOY GIPOKINEZII]
Ye. N. Birukov, L. I. Kakurin, G. I. Kozyrevskaya, Yu. S. Koloseva, Z. P. Payek, and S. V. Chizhov Washington, NASA, Jul. 1967 7 p refs Transl. into ENGLISH Kosmich Biol. i Med., v. 1, no. 2, 1967 p 74–79
(NASA-TT-F-11141) CSCL 06P

Water-salt metabolism was studied in six healthy young men in a 62-day bed rest experiment. Prior to the experiment subjects were exposed to accelerations of 13 to 15 g. The diet consumed provided 3000 to 3500 cal/day. The amount of water consumed, urine excreted, and the diuresis rate were investigated. The electrolytic composition of the blood, urine and feces was determined. The 62-day bed rest resulted in a decrease of water consumption, a change of the diuresis rate, and a shift of the electrolytic composition of urine and feces. The changes were of a phasic character. Two periods were distinguished in the dynamics of water-salt metabolism: (1) the stage of reconstruction covering 3 to 4 weeks, and (2) that of a relative stabilization of metabolism at the level adequate to the new conditions. Peculiarities of the shifts revealed in water-salt metabolism indicate the development of dehydration and decalcification. Author

N67-37890# Albert Einstein Medical Center, Philadelphia, Pa. Lab. of Experimental Dermatology.
EFFECT OF IONIZING RADIATION ON THE DISTRIBUTION OF DEOXYRIBONUCLEASES AND PHOSPHATASES IN SUBCELLULAR FRACTIONS OF GUINEA PIG EPIDERMIS Third Year Comprehensive Report, 14 Aug. 1964–31 May 1967
Joseph Tabachnick 31 May 1967 13 p refs
(Contract AT(30-1)-3445)
(NYO-3445-13) CFSTI: HC $3.00/MF $0.65

Progress is reported on studies on the effects of radiation on the distribution of enzymes in subcellular fractions of guinea pig epidermis. Results are summarized from studies on the effect of β irradiation of the skin on the content of 7 acid and 7 neutral or alkaline epidermal hydrolases. Only acid hydrolase was found to be increased significantly after exposure of skin to 300 rep β irradiation. These findings indicate that the release of destructive acid hydrolases is not a primary radioinduced lesion leading to the death of cells in irradiated epidermis. Histochemical evidence of the presence of lysosomes in guinea pig epidermal cells was obtained. An increase in DNase was observed in irradiated guinea pig skin and appeared to be a general response associated with cutaneous inflammation. NSA

N67-37895# Hawaii Univ., Honolulu.
STUDIES OF THE EFFECT OF IONIZING RADIATIONS ON THE PROCESSES OF CELLULAR PROLIFERATION, MEGASPOROGENESIS, AND EMBRYO-SAC DEVELOPMENT Progress Report
Yoneo Sagawa 22 May 1967 9 p
(Contract AT(04-3)-235)
(UH-235P6-3) CFSTI: HC $3.00/MF $0.65

Orchids were used to study the effect of ionizing radiations on the processes of megasporogenesis and embryo sac development. Unlike most flowering plants, megasporogenesis must be induced in orchids, and is accomplished by pollination. The stages in the processes of megasporogenesis and embryo sac development occur over a prolonged period of time (50 to 60 days) and this allows ample time to isolate and treat materials in specific stages. Results are reported from studies on the effects of exposure to 500, 7,500, or 10,000 R x radiation on fruit set of *Dendrobium phalaenopsis* type orchids examined at weekly intervals from 1 to 9 weeks after pollination. Data are included on the induction of chromosome aberrations and necrosis, cellular proliferation, embryo sac development, and megasporogenesis. NSA

N67-37924* Naval School of Aviation Medicine, Pensacola, Fla.
ENERGY DISSIPATION CHARACTERISTICS IN TISSUE FOR IONIZING RADIATION IN SPACE Progress Report, 1 Jun.–31 Aug. 1967
Hermann J. Schaefer 31 Aug. 1967 3 p
(NASA Order R-75)
(NASA-CR-88502; PR-19) CSCL 06R

Preliminary investigations and the inquiries to be undertaken are briefly outlined. It is pointed out that very little work has been done on tissue ionization dosages applicable to the inside of an SST in the 60,000 to 65,000 foot altitude. Limitations and discrepancies in published measurements are indicated. N.E.N.

N67-38005# Army Medical Research and Nutrition Lab., Denver, Colo.

ENERGY, NITROGEN, AND WATER REQUIREMENTS OF NORMAL ADULTS RESIDING AT 4300 METERS FOR 28 DAYS

C. Frank Consolazio, Le Roy O. Matoush, Herman Johnson, and Ted A. Daws Jul. 1967 27 p refs

(Rept.-308; AD-656462)

Balance studies were conducted on three groups of young, healthy adults between the ages of 18-24 years. After control studies, Group I was taken to 4300 meters gradually, Group II was taken to 4300 meters abruptly, and Group III remained at sea level during the entire study. One-half of each group were physically conditioned. No significant differences were observed in nitrogen, and fluid balances between: (a) the groups that were taken to altitude gradually or abruptly, or (b) between the groups that were physically conditioned, and those who did not exercise. As a result, the respective groups were combined for comparative purposes. Three factors were prominent during the 28 day high altitude exposure to 4300 meters that included: (a) a decrease in food intake which is probably due to anorexia caused by the clinical symptoms; (b) a negative nitrogen balance which may be due to the decreased nutrient intake and the increased requirement for energy; and (c) a negative fluid balance due to involuntary dehydration and other undetermined factors. These factors appeared to be somewhat less in Group I who ascended to altitude gradually, and suggests the beneficial effects of ascending to high altitude gradually. Author (TAB)

N67-38010*# National Aeronautics and Space Administration, Washington, D. C.

MEANS OF DETERMINING THE MAXIMUM ALLOWABLE CONCENTRATION OF TOXIC PRODUCTS OF NATURAL HUMAN METABOLISM [PUTI USTANOVLENIYA PREDEL'NO DOPUSTIMYKH KONTSENTRATSIYA TOKSICHESKIKH PRODUKTOV YESTESTVENNOGO METABOLIZMA CHELOVEKA]

V. V. Kustov Oct. 1967 4 p ref Transl. into ENGLISH from Obshchiye Vopr. Prom Toksikol. (Moscow), 1967 p 63-65

(NASA-TT-F-11358) CFSTI: HC $3.00/MF $0.65 CSCL 06P

The effect of the 7 to 8 hour action of carbon monoxide, ammonia, and acetone on certain physiological and biochemical indices in man is proposed as the basis for determining the maximum allowable concentrations for human natural metabolic products. Author

N67-38019*# Scientific Translation Service, La Canada, Calif.

EFFECT OF ACCELERATION AND HYPOKINESIA ON THE FUNCTIONAL STATE OF THE STOMACH [VLIYANIYE NEKOTORYKH EKSTREMAL'NYKH VOZDEYSTVIY NA FUNKTSIONAL'NOYE SOSTOYANIYE ZHELUDKA]

P. I. Yegorov, K. V. Smirnov, M. M. Korotayev, and M. V. Lukasheva Washington, NASA, Jul. 1967 6 p refs Transl. into ENGLISH from Kosmich. Biol. Med. (USSR), v. 1, no. 2, 1967 p 71-74

(Contract NASw-1496)

(NASA-TT-F-11140) CSCL 06S

The experiments were performed on 5 male test subjects who were twice exposed to chest-to-back accelerations of 11.9-14.5 g with an interval of 4 to 6 days. After the exposures the test subjects remained in the state of hypokinesia for 2 months after which they were re-exposed to accelerations of 11 to 16 g. The exposure to accelerations inhibited the secretory and enzyme forming gastric functions. The acidity of the intestinal juice tended to increase. Hypokinesia conditions produced further inhibition of the stomach glands. Author

N67-38033*# Astro Research Corp., Santa Barbara, Calif.

SOME CONSIDERATIONS OF MANNED EXTRAVEHICULAR ACTIVITIES IN ASSEMBLY AND OPERATION OF LARGE SPACE STRUCTURES

H. Schuerch Washington, NASA, Sep. 1967 22 p

(Contract NAS7-427)

(NASA-CR-871; ARC-R-217) CFSTI: HC $3.00/MF $0.65 CSCL 05H

Concepts are formulated by which man's extravehicular activities in assembly and operations of space structures can be placed into perspective. Man's outstanding capability of adaption, intelligent anticipation, and dexterity are identified as primary components of his usefulness in this function. These capabilities are considered in view of their use in specific phases of space programs, varying from the initial development phases to the operation of matured systems. Author

IAA ENTRIES

A67-37729 *
THE SECRETORY ACTIVITY OF ALGAL CELLS IN BUFFERED MEDIA.
Constantine Sorokin and Larissa Mitrofanov (Maryland, University, Dept. of Botany, College Park, Md.).
Protoplasma, vol. 62, no. 2-3, 1966, p. 201-209. 11 refs.
Grant No. NsG-70.

Study of the effect of the activity of algal cells on the buffering characteristics of suspending fluid, investigating Chlorella 7-11-05 cells suspended in Tris buffer or in sodium citrate-citric acid. The experimental procedures are described and titration curves given. Results show that changes in the buffering capacity of the suspending fluid is a function of three factors - the concentration of the original buffer, the pH, and the nature of the buffer. In Tris buffer, not consumed by Chlorella cells, the buffering capacity, measured in van Slyke's index (β), increased with time. In sodium citrate-citric acid buffer, both the buffer index (β) and the pH underwent changes. In both Tris and citrate buffers the newly formed systems showed a maximum buffering capacity at pH 6.4 corresponding to the pK_1 of carbonic acid. A. B.

A67-37898 *
THE SALT GLAND IN A SEA SNAKE (LATICAUDA).
Aaron M. Taub and William A. Dunson (Pennsylvania State University, Dept. of Biology, University Park, Pa.).
Nature, vol. 215, Aug. 26, 1967, p. 995, 996. 13 refs.
NASA-supported research.

Study in which an attempt is made to identify the salt glands of the Laticauda semifasciata sea snake and to compare them with the homologous gland of another sea snake, Pelamis platurus. The absence of nasal and Harderian glands in Pelamis, the pelagic Hydrophiid, supported the conclusion that in sea snakes these glands are not the salt glands. M. F.

A67-37919 *
SUBCELLULAR SITES INVOLVED IN LIPID SYNTHESIS IN SACCHAROMYCES CEREVISIAE.
Harold P. Klein, Carol M. Volkmann, and Morris A. Leaffer (NASA, Ames Research Center, Exobiology Div., Moffett Field; Stanford Research Institute, Life Sciences Div., Menlo Park, Calif.).
Journal of Bacteriology, vol. 94, July 1967, p. 61-65. 18 refs.

When the crude ribosomal fraction of Saccharomyces cerevisiae was separated into "light" and "heavy" fractions, fatty acid synthetase was concentrated in the former, whereas acetyl-Coenzyme A synthetase, fatty acid "desaturase," and squalene oxidocyclase were found in the latter. The "desaturase" sedimented with the ribosomal material and was not solubilized by low concentrations of sodium deoxycholate (DOC). The other two systems found in the "heavy" fraction sedimented with the membranes, but, upon solubilization of the membranes by DOC, these enzyme systems remained as particles. (Author)

A67-37934
EQUIPMENT FOR AVIATORS AND COSMONAUTS [SNARIAZHENIE LETCHIKA I KOSMONAVTA].
S. P. Umanskii.
Moscow, Voennoe Izdatel'stvo Ministerstva Oborony SSSR, 1967. 192 p. In Russian.

This book treats the subject of protective equipment needed by aircraft and spacecraft crewmembers. Attention is given to clothing designed to give protection from environmental stresses including exposure in the event of crashes at sea. The problems of overload and weightlessness are discussed, and pressurization systems are described. The special equipment which cosmonauts require for extravehicular activity and will need to land on the moon is illustrated to show how all eventualities that can be anticipated are guarded against. P.v.T.

A67-37948 #
PROCESSES OF OPERATOR ADAPTATION IN CONTROL TASKS ASSOCIATED WITH A CHANGE IN THE PLANT'S DYNAMICS [PROCESY ADAPTACJI OPERATORA TOWARZYSZĄCE ZMIANIE DYNAMIKI OBIEKTU W ZADANIACH STEROWANIA].
Janusz M. Morawski and Andrzej P. Firla.
Instytut Lotnictwa, Prace, no. 30, 1967, p. 3-8. 9 refs. In Polish.

Preliminary results of studies concerned with the adaptive processes of a human operator during control tasks involving a sudden change of the controlled plant's dynamics. Tests were conducted with a simulated aircraft control-rod and seven different operators. A simulated run was performed during which the closed-loop signal was discontinued at the moment of change in the plant's dynamics and the operator was left to identify the plant without exterior influences. The measurement system used in the tests is described in detail. Results are discussed in terms of the influence of the plant's dynamic characteristics on the degree of difficulty experienced by the operator. The adaptive behavior of the operator is analyzed in terms of the requirements for system stability and control precision. Associated problems of operator selection and training are briefly considered. T. M.

A67-38068
EFFECTS OF GLUCOSE LOADING ON THE ELECTROCARDIOGRAM OF PILOT APPLICANTS.
G. F. Catlett, G. J. Kidera, and J. E. Smith (United Air Lines, Inc., Medical Dept., Chicago, Ill.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 775-779. 17 refs.

The use of a glucose challenge test to screen pilot applicants for latent diabetes is now widely practiced in commercial aviation medicine. Several reports have indicated however, that heavy carbohydrate loading can produce factitious abnormalities in the electrocardiogram of persons without heart disease while other reports have suggested that such loading can demonstrate occult heart disease. To evaluate the relevance of these facts to pilot selection examinations, 220 pilot applicants, all below 33 years of age and without demonstrable heart disease, were studied before and after the ingestion of glucose. In none of the cases studied were electrocardiographic changes produced which could be interpreted as abnormal, although a measurable variation in the voltage of the T-wave and S-T segment was noted in nearly all cases. From these results it was concluded that the ingestion of a diagnostic dose of carbohydrate for a glucose challenge test has no significant effect upon the electrocardiographic patterns of healthy young men and there is no contraindication to performing simultaneous carbohydrate tolerance studies and electrocardiographic evaluations in pilot applicant physical examinations. (Author)

A67-38069
FATAL INJURIES RESULTING FROM EXTREME WATER IMPACT.
Richard G. Snyder (Ford Motor Co., Biomechanics Dept., Office of Automotive Safety Research, Dearborn, Mich.) and Clyde C. Snow (Federal Aviation Administration, Aeromedical Service, Civil Aeromedical Research Institute, Oklahoma City, Okla.).
(Aviation Medical Society of Australia, International Meeting on Aerospace Medicine, Sydney, Australia, Nov. 27-Dec. 1, 1966, Paper.)
Aerospace Medicine, vol. 38, Aug. 1967, p. 779-783. 14 refs.

Increased overwater flight has resulted in an increase in both military ejections and civil crash landings in water, 78 general aviation water accidents occurring last year. A study was made to determine mechanisms of gross trauma in nonpenetrating fatal water impact. The method involved analysis of necropsy data on 169 fatal (52 female, 117 male) jumps from the Golden Gate Bridge. Impact velocities ranged from 106-112 ft/sec, and body orientation was mainly transverse or lateral. The most common mechanism of injury was crushing of the thoracic cage with resultant bilateral rib fractures and penetration of the vital organs (85.2%). Lung

lacerations, ruptured livers, brain injury, and drowning were most frequent. In 17 cases, no skeletal fractures were found. Eight individuals, apparently relatively uninjured by the impact, subsequently drowned. These data reinforce previous work indicating that human tolerance in water impact ranges close to 116 ft/sec velocity, and that body orientation is critical. Additional protection in transverse and lateral impact must be considered for increased survivability. (Author)

A67-38070 * #
COMPARATIVE PATHOLOGY OF ANIMALS EXPOSED TO CARBON TETRACHLORIDE IN OXYGEN AT 258 MM. HG AND IN AMBIENT AIR.
David T. Harper, Jr. and Farrel R. Robinson (USAF, Washington, D.C.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 784-788. 20 refs.
USAF-NASA-sponsored research.

Dogs, monkeys, rats, and mice were continuously exposed to various concentrations of carbon tetrachloride vapor in an altitude chamber for 14 days. Exposures to similar concentrations were conducted at ambient and at 5 psia, 100% oxygen (altitude) conditions. Differences observed in animals exposed to similar concentrations at ambient and altitude conditions included greater mortality and necrosis of liver cells in mice and greater amounts of stainable liver fat in all species at altitude. Numerous deaths among Wistar rats at altitude were probably related to that environmental condition and were probably not due to the contaminant exposures. The parallels between oxygen and carbon tetrachloride toxicity are discussed in light of the apparent additive effects of high concentrations of oxygen and toxic levels of carbon tetrachloride. (Author)

A67-38071 #
POTABLE WATER STANDARDS FOR AEROSPACE SYSTEMS - 1967.
A. R. Slonim, A. J. Roth, Jr., A. B. Hearld, S. A. London, and A. West (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Life Support Div. and Toxic Hazards Div., Wright-Patterson AFB, Ohio).
Aerospace Medicine, vol. 38, Aug. 1967, p. 789-799. 34 refs.

Recommendation to aerospace engineers of performance goals and limits of acceptability of water quality control in order to qualify water-supply systems. Procedures for monitoring operational units upon qualification are recommended. The recommended standards are divided into two parts. The first deals with qualification of the technique and is subdivided into general requirements (performance goals) and specific requirements (limits of acceptability). The second part consists of procedures for monitoring the water from qualified units for potability. It is intended that these standards serve only as a working guide, assisting perhaps in the design, construction, and evaluation of aerospace water systems, and that they be reevaluated and revised periodically in accordance with advances made in life-support technology. These standards could be applied to many aerospace functions ranging from isolated ground-based missions to space exploration. M.M.

A67-38072
ISOLATION OF ACINETOBACTER ANITRATUS (DEBORD) BRISOU AND PREVOT, FROM ROOM AREAS AND A HUMAN SUBJECT IN A CONTROLLED ACTIVITY FACILITY.
Peter P. Madri (Long Island University, Brookville, N.Y.; Fairchild Hiller Corp., Microbiology Laboratory).
Aerospace Medicine, vol. 38, Aug. 1967, p. 799, 800. 13 refs.
Contract No. AF 33(615)-3255.

During a study for the USAF involving four men in semiconfinement in a controlled activity facility, Acinetobacter anitratus (Herellea vaginicola) was isolated from the gingiva of one subject and two room areas. The organism appeared 43 days after the beginning of the experiment and was not found after the fifty-eighth day. Although the source of this potential pathogen could not be established, its presence may have been due to either an overgrowth on a healthy carrier or introduction through the diet. (Author)

A67-38073 #
SUSTAINED PILOT PERFORMANCE REQUIRES MORE THAN SKILL.
Bryce O. Hartman and George K. Cantrell (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 801-803.

A study of crew workload in the C-141 provided data which could be used to study living and working schedules during extended missions. A model mission was empirically derived and demonstrated major disruptions in the daily patterns of eating, sleeping, and working. Situational factors associated with flying through several time zones appeared to have a primary effect. Actual reports from the field supported these findings. While it is reasonable to hypothesize that these and similar factors should reduce the crewman's physical and psychological fitness for sustained flying proficiency during demanding missions, the crucial studies remain to be done. (Author)

A67-38074
EXPERIMENTAL STUDY OF PERFORMANCE CHARACTERISTICS IN A ZERO POTENTIAL ENERGY MANUAL TASK.
I. Streimer, D. P. W. Turner, and K. Volkmer (North American Aviation, Inc., Space and Information Systems Div., Downey; San Fernando Valley State College, Northridge, Calif.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 804-807. 27 refs.

The findings and implications of experimental data obtained during the investigation of a flexion-extension (sawing) type of task are discussed. Experimental equipment was designed with extremely low friction to capitalize on the absence of potential energy similar to that of zero gravity where a fixed-man loose-object relationship could be duplicated. The comparative differences of work output characteristics of efficiency, rate, and total amplitude attributable to the absence or presence of potential energy are discussed. The implications defining the maximum capabilities and minimum requirements of an operator performing this specific task are presented. (Author)

A67-38075
CRASH AND BALLISTIC PROTECTIVE FLIGHT HELMET.
Abraham L. Lastnik (U.S. Army, Natick Laboratories, Natick, Mass.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 808-811. 8 refs.

A helmet has been developed to upgrade head protection for Army aviators. This helmet exhibits greater impact energy-dissipating characteristics than other military helmets and also provides resistance to penetration by ballistic fragments. While the Army's new helmet has the same configuration as the Navy's APH-6 and Air Force HGU-2A/P helmets, increased protection is achieved by making its shell of laminated nylon fabric instead of laminated glass cloth. Impact energy attenuation is further increased by lining the shell with 1/2-in. thick, four-lb density, expanded polystyrene plastic. Subjected to two successive impacts of 160 ft-lb in the same area, there was no evidence of bottoming, nor were accelerative forces in excess of 300 G measured on an instrumented headform. Duration of impacts was not less than 6.0 msec. The glass cloth helmet impacted with only 100 ft-lb imparted 300 and 600 G, with duration of impacts not exceeding 4.0 msec. (Author)

A67-38076
DECOMPRESSION SICKNESS - A STUDY OF CAVITATION AT THE LIQUID-LIQUID INTERFACE.
B. A. Hills (Adelaide, University, Dept. of Chemical Engineering, Adelaide, Australia).
Aerospace Medicine, vol. 38, Aug. 1967, p. 814-817. 12 refs.

Cavitation by decompression has been studied at various interfaces between hydrophobic liquids and aqueous fluids. The parameters investigated include temperature, extent of decompression, gas solubility, dispersion of the liquids, and the thermodynamic properties of the relevant phase boundaries. Results indicate random nucleation and no significant metastable limit to the supersaturation of the interfaces by gas. The preferential separation of the gas phase at such sites is discussed in relation to decompression sickness and the optimal deployment of decompression time according to an equilibrium criterion. (Author)

A67-38077
CONTAMINANT CONTROL IN SPACE CABINS - APPROACH AND RESULTS.
P. P. Mader and E. S. Mills (McDonnell Douglas Corp., Advance Biotechnology Dept., Life Environmental Systems Branch, Santa Monica, Calif.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 822-825.
Research sponsored by the Douglas Independent Research and Development Program.

A procedure for the systematic screening of materials and supplies intended for use inside space cabins is described. All outgassing experiments were conducted at 120°F, and the significance of the test temperature is discussed. Some of the data obtained in this survey with paints, insulation materials, etc., are reported. During the manned operation of the space cabin simulator, the atmosphere was tested in regular intervals for the accumulation of toxic compounds. Gas chromatographic, infrared, and wet chemical analyses were performed. It was frequently possible to observe the appearance of new contaminants and to pinpoint their sources so that remedial action could be taken. (Author)

A67-38078
RELATIONSHIP OF SCUBA DIVING TO THE DEVELOPMENT OF AVIATORS' DECOMPRESSION SICKNESS.
Donald E. Furry, Elizabeth Reeves, and Ed Beckman (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 825-828. 14 refs.

Investigation of the amount of decompression required before flying after diving. Large dogs were exposed to compressed air for 7 hours at their "no-bends" pressure threshold as determined after the method of Reeves and Beckman. After pressurization, the animals were decompressed within 2 to 3 minutes to sea level. A sea-level decompression interval of 1, 3, 6, or 12 hr was given prior to further decompression to a simulated altitude of 10,000 ft. The incidence of decompression sickness at altitude was 92.9% for the 1-hr surface-decompression interval, 30% for the 3-hr interval, 27.8% for the 6-hr interval, and 0% for the 12-hr interval. From these animal studies it may be postulated that a surface decompression interval of at least 12 hr should be allowed before flying after compressed air diving of a depth and duration to require the use of diving tables. M.M.

A67-38079
PERMEATION OF NEON, NITROGEN AND SULFUR HEXAFLUORIDE THROUGH WALLS OF SUBCUTANEOUS GAS POCKETS IN RATS.
Hugh D. Van Liew and Marilynn Passke (New York, State University, Dept. of Physiology, Buffalo, N.Y.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 829-831. 14 refs.
PHS Grant No. AM-08070-03.

Investigation of gas permeation through living tissue in rats, using subcutaneous gas pockets. Two different types of experiments show that neon and nitrogen are approximately equal in permeation through the tissue surrounding the rat pocket. Therefore neon is expected to behave like nitrogen in decompression sickness bubbles that are in nonfat tissue. When a slowly permeating gas is injected into the pocket of an air-breathing animal, the pocket volume increases because N_2 enters faster than the slow gas can leave. This has been demonstrated with rat pockets containing SF_6 and is analogous to the increase of decompression sickness bubbles that can be expected when a patient changes from a breathing gas that permeates slowly to one that permeates more rapidly. M.M.

A67-38080 #
EFFECT OF A SPACE CABIN ENVIRONMENT ON VIRAL INFECTION.
David J. Giron, Frank F. Pindak, and Jerome P. Schmidt (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 832-834. 7 refs.

Host resistance of mice to intraperitoneally administered mengovirus appeared to be related to changes in environmental conditions. Thus, increased susceptibility was demonstrated if animals conditioned for 14 days to 380 mm Hg total pressure and normal pO_2 were returned to ground level, or if nonconditioned animals were exposed to space cabin conditions, immediately after infection. Conditioned animals remaining in the space cabin after infection were not more susceptible than ground controls. However, if conditioned animals were brought to ground level for infection and then returned within 1 hr to the space cabin, they were significantly more susceptible. (Author)

A67-38081 #
CABIN PRESSURIZATION CHARACTERISTICS OF USAF AND COMMERCIAL TRANSPORT AIRCRAFT.
Alan J. Greenwald and Robert G. McIver (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Physiology Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 834-837. 20 refs.

A reference list containing cabin pressurization characteristics of USAF and of several commercial transport aircraft has been compiled. It is anticipated that the list will be of value to physicians confronted with the necessity of transporting patients by air. Special emphasis has been given to the entity of decompression sickness. Personnel engaged in research and development related to problems of cabin pressurization and pressure suits should also find such a list of value. (Author)

A67-38082
VASOPRESSIN-ALDOSTERONE INTERRELATIONSHIPS IN DIURESIS AND ANTIDIURESIS-RELEVANCE TO SPACE TRAVEL.
G. Henry Schmitt (Kentucky, University, College of Medicine, Dept. of Pharmacology, Lexington, Ky.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 838-842. 23 refs.
NIH-supported research.

Nonpressor doses of arginine-vasopressin were shown to be diuretic and natriuretic during isotonic saline loading, but to be antidiuretic during water loading in dogs. At higher, also nonpressor dosages a diuretic and natriuretic effect was seen during either saline or water loading. An antidiuretic response was seen to any of these doses of vasopressin if a mineralocorticoid (DOCA) was administered concurrently. Water infusion caused hyponatremia which is known to stimulate endogenous aldosterone secretion. These data suggest that vasopressin is antidiuretic only when it acts together with sufficient exogenous or endogenous mineralocorticoid hormone, but is diuretic and natriuretic if relatively more vasopressin or less aldosterone acts upon the kidneys. Since adrenal secretion of aldosterone is known to decrease during recumbency, it is suggested that the same might occur during the weightless state. It is proposed that the above mechanism might contribute to the body fluid weight loss of astronauts during space travel. (Author)

A67-38083 *
EFFECT OF DRUGS IN ALTERING SUSCEPTIBILITY TO MOTION SICKNESS IN AEROBATICS AND THE SLOW ROTATION ROOM.
Frederick R. Deane, Ashton Graybiel (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.), and Charles D. Wood (Arkansas, University, School of Medicine, Little Rock, Ark.).
(Aerospace Medical Association, Annual Meeting, 37th, Las Vegas, Nev., Apr. 19, 1966, Paper.)
Aerospace Medicine, vol. 38, Aug. 1967, p. 842-845. 12 refs.
NASA-sponsored research.

Seven exemplary antimotion sickness drugs and three "individually treated" placebos were investigated in 10 men during 24 aerobatic maneuvers in an AlE "Skyraider" aircraft and in performance of a Slow Rotation Room (SRR) dial test. The rank order of drug effectiveness and of subject susceptibility under each condition was determined and compared. Individual difference in drug effectiveness was significant at the .01 level or better and was similar under the two conditions. Susceptibility to motion sickness in the SRR was generally a good predictor of susceptibility in aerobatics in eight subjects, but in the remaining two it was grossly in error. A combination of scopolamine and d-amphetamine was by far the most effective of the drugs tested. (Author)

A67-38084
MEASUREMENT OF GASTROESOPHAGEAL REFLUX IN THE EVALUATION OF HIATUS HERNIA AND CHEST PAIN IN FLIERS.

David B. Skinner and Thomas F. Camp, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Surgery Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 846-850. 10 refs.

A standardized method to quantitate gastroesophageal reflux using intraluminal pressure and pH measurements has been employed in 45 patients at the Consultation Service of the USAF School of Aerospace Medicine. The method is described, and the results are presented and compared to standard methods of evaluation. Three illustrative cases are described. Since reflux causes the symptoms and complications commonly attributed to hiatal hernia, but can occur in the absence of a hernia, measurement of reflux permits objective assessment of the significance of a hiatal hernia and possible esophageal origin of chest pain. The technique appears valid and more sensitive than radiographic studies, and proved valuable when applied to the problems presented by the patients studied. (Author)

A67-38085 #
FOURTEEN AND SIX PER SECOND POSITIVE SPIKING - AN EEG FINDING IN SOME AIRCREW PERSONNEL.
William J. Crowley, Jr. (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Neurology Branch, Brooks AFB, Tex.) and E. Liske (Baylor University, College of Medicine, Dept. of Internal Medicine and Dept. of Neurology, Houston, Tex.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 851-855. 18 refs.
USAF-sponsored research.

Retrospective study of EEGs of aircrew personnel to obtain information about the 14 and 6/sec positive spike phenomenon. Normal subjects numbering 1279 and medical referrals numbering 4115 revealed virtually the same incidence of this finding. Clinical correlations were weak for loss of consciousness, headache, abdominal complaints, and character disorder. Correlation was very strong for drowsiness at the time of recording and suggests that 14 and 6/sec positive spiking may be a normal variant of sleep EEG patterns. The data obtained cannot support the policy of removing a pilot from flying status on the sole basis of 14 and 6/sec positive spiking in his EEG. M.M.

A67-38086
AIRSICKNESS AND ANXIETY.
Gary J. Tucker and Roger F. Reinhardt (Yale University, School of Medicine, Dept. of Psychiatry, New Haven, Conn.; U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Aerospace Medicine, vol. 38, Aug. 1967, p. 855-858. 9 refs.

Experimental large-scale correlation of airsickness in early flight training with subjective anxiety. During a two-month period, 149 naval flight students undergoing primary flight instruction filled out a questionnaire immediately after their fifth flight. Seventy-two of these students, randomly selected, were studied more intensively, in that their flight instructor also filled out a questionnaire after the fifth flight, and this group was surveyed again at the completion of primary training. The airsick group differed significantly from the nonairsick in the following subjective areas: (1) feeling more nervous (2) more autonomic symptoms, (3) lower motivation, and (4) found instructors less likable. The airsick group had a significantly higher attrition rate - namely, 21%. The airsick group still experienced more anxiety at the completion of primary training. M.M.

A67-38148 *
EXTERNAL-EAR REPLICA FOR ACOUSTICAL TESTING.
Benjamin B. Bauer, Allan J. Rosenheck, and Louis A. Abbagnaro (Columbia Broadcasting System, Inc., CBS Laboratories, Stamford, Conn.).
(Acoustical Society of America, Spring Meeting, 71st, Boston, Mass., June 1-4, 1966, Paper.)
Acoustical Society of America, Journal, vol. 42, July 1967, p. 204-207. 9 refs.
NASA-supported research.

As part of the development of an acoustical manikin, an artificial ear was designed to simulate the mechanical and acoustical properties of the external ear, up to and including the impedance of the eardrum. The sensing element is a B and K 4132 electrostatic microphone terminating a simulated ear canal with an acoustical impedance-matching network that, combined with the microphone, furnishes the eardrum impedance. The canal proper has dimensions approximating those of the real ear and is placed inside a skull of polyester-impregnated fiberglass, provided with a plastisol pinna of realistic dimensions and texture. The head is mounted on a fiber torso. The new artificial ear is suitable for testing all types of receivers and ear enclosures under realistic conditions. The inner portion of the artificial ear is made of reproducible metallic components, making it suitable for consideration as an artificial-ear standard. (Author)

A67-38158 #
NEW DEVICES FOR MAN-MACHINE INFORMATION EXCHANGE [EMBER ÉS GÉP INFORMÁCIÓCSÉRÉJÉNEK ÚJ ESZKÖZEI].
József Hatvany (Magyar Tudományos Akadémia, Automatizálási Kutató Intézet, Budapest, Hungary).
(Ipari Elektronikus Mérés és Szabályozás, Symposium, Budapest, Hungary, Aug. 1967, Paper.)
Mérés és Automatika, vol. 15, no. 7-8, 1967, p. 254-259. 76 refs.
In Hungarian.

Survey of new devices for the exchange of information between man and machine, with special emphasis on video display equipment. Such devices include equipment for understanding and producing human speech and equipment for reading printed and handwritten texts. The probable role and expansion of these devices and their development trends are evaluated with respect to research being performed in Hungary. R.B.S.

A67-38425 #
CALCULATION OF THE DERIVATIVES OF A RADIATION DOSE BY THE MONTE CARLO METHOD IN THE OPTIMIZATION OF THE SHAPE AND COMPOSITION OF RADIATION-PROTECTION SHIELDS [VYCHISLENIE PROIZVODNYKH DOZY METODOM MONTE-KARLO DLIA OPTIMIZATSII FORMY I SOSTAVA RADIATSIONNOI ZASHCHITY].
M. Z. Brainina, V. L. Generozov, V. G. Kuznetsov, and V. A. Sakovich.
Zhurnal Vychislitel'noi Matematiki i Matematicheskoi Fiziki, vol. 7, July-Aug. 1967, p. 953-957. In Russian.

Application of the Monte Carlo method to a determination of the derivatives of radiation doses and the derivatives of optimum shape and composition of protective shields. The advantages of the Monte Carlo method in determining the radiation transmission by shieldings of complex shape and structure are pointed out. V.Z.

A67-38507 #
VISUAL ACUITY IN HYPOXIA MEASURED BY SYMBOLS PRESENTED INDIVIDUALLY OR COMBINED [COMPORTAMENTO DEL VISUS IN IPOSSIA, MISURATO CON SIMBOLI RAVVICINATI E PRESENTATI SINGOLARMENTE].
R. Neuschüler and M. Frustaci.
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Apr.-June 1967, p. 240-250. 21 refs. In Italian.

Investigation of retinal discrimination at different degrees of hypoxia by reading the letter E both individually and combined. In 13 of the 32 subjects tested, a decrease of various degrees in retinal discrimination was reported in hypoxia for both oxygen-poor mixtures used (13.6 and 9.2% O_2). Significant differences between the eyes and a precise correlation between the two simulated altitudes and the rate of discrimination decrease were not found. The retinal discriminative power increased in six subjects who had previously shown a different response in reading individual and combined Es, by increasing the normal luminosity of the optotypes from 90 to 140 lux. This result is accounted for by the favorable effect on vision of increased optotype luminosity, due to improvement in contrast power. M.M.

A67-38508 #
CONTRIBUTION TO THE STUDY OF MEDICOLEGAL PROBLEMS OF FLIGHT ACCIDENT INJURIES [CONTRIBUTO ALLO STUDIO DEI PROBLEMI MEDICO-LEGALI RELATIVI ALLA LESIVITA' DA DISASTRI AEREI].
G. Rotondo.

Rivista di Medicina Aeronautica e Spaziale, vol. 30, Apr.-June 1967, p. 251-291. 45 refs. In Italian.

Brief survey of various types of aircraft flight accidents and related traumatic mechanisms. Various body lesions found in victims of flight accidents are examined in detail. They are divided into skeletal lesions, lesions to internal organs, and to external teguments. The pathogenetic interpretation of each lesion is discussed. The possibility of reconstructing the causes and details of flight accidents is discussed. This can be done by studying the differential characteristics of the various traumatic pictures that can be found in various flight accidents, considering the kinedynamics of each accident and the stage of the accident in which a lesion occurred. This reconstruction can lead to the prevention of accidents and injuries. M.M.

A67-38509 #

SOME ASPECTS OF THE SO-CALLED TRAUMATIC DISEASE [SU ALCUNI ASPETTI DELLA COSIDDETTA MALATTIA TRAUMATICA].

G. Paolucci.

(Congresso Nazionale di Medicina del Traffico, 4th, Bologna, Italy, Mar. 4-6, 1967, Comunicazione.)

Rivista di Medicina Aeronautica e Spaziale, vol. 30, Apr.-June 1967, p. 292-306. 8 refs. In Italian.

Results of an experimental investigation of traumatic sickness. Impacts of $+10G_x$, repeated in time, produced mild changes in the activity of serum enzymes in dogs. Only malic dehydrogenase (MDH) increased definitely 30 minutes after impact and became normal after 24 hr. Continuing the traumatic action, one animal died; shortly before death, an unexpected increase in all enzymatic activities was recorded. In this animal the anatomicopathological aspect of the internal organs was characterized, in addition to obvious hemorrhagic lesions, by fibrosis of the liver and spleen and by hypertrophy of the adrenal gland cortex. These findings led to the formulation of a hypothesis of immunizing reaction. M.M.

A67-38510 #

DEVELOPMENT OF VERTEBRAL FRACTURES FROM EJECTION AND MEDICOLEGAL CONSIDERATIONS [EVOLUZIONE DELLE FRATTURE VERTEBRALI DA EJEZIONE E CONSIDERAZIONI MEDICO-LEGALI].

P. Italiano.

Rivista di Medicina Aeronautica e Spaziale, vol. 30, Apr.-June 1967, p. 307-323. 25 refs. In Italian.

Description of the most common radiological findings from an investigation from two to ten years of ten ejected pilots afflicted with vertebral fractures: (1) fracture of the anterosuperior margin of the vertebra; and (2) wedge-shaped fracture of the vertebra. The former fracture becomes stabilized with only minor morphological changes in the vertebral body and its corresponding intervertebral disk, sometimes taking on a normal radiological appearance. The latter fracture generally becomes stable with an obvious appearance of spondylo disk arthrosis. From the medicolegal standpoint, it is noted that these lesions are not all necessarily disqualifying for jet flying. M.M.

A67-38515

ELIMINATION OF INERT GAS BY THE LUNG.

L. E. Farhi (New York, State University, Dept. of Physiology, Buffalo, N.Y.).

Respiration Physiology, vol. 3, Aug. 1967, p. 1-11. 19 refs. USAF-supported research.

General study of the determinants involved in inert-gas elimination in a theoretical lung in which the ventilation-perfusion ratio is equal in all elements. When an inert gas G which is not part of the inspirate is present in the mixed venous blood at a partial pressure $P\bar{v}_G$, the partial pressure of G in an alveolus, P_{A_G}, or in the blood returning from this alveolus will be governed by several factors. These are λ, the Ostwald partition coefficient for that gas, $\dot{V}_A$, the ventilation of the alveolus, and $\dot{Q}$, its perfusion, according to the equation $P_A = P\bar{v} \times \lambda/\lambda + \dot{V}_A/\dot{Q}$. The clearance of such a gas, Cl, is given by $(\dot{V}_A \times \dot{Q})/(\dot{V}_A + \lambda\dot{Q})$, indicating that when $\dot{V}_A/\dot{Q}$ is much higher than λ, the clearance is dictated by the ventilation, while at $\dot{V}_A/\dot{Q}$ considerably lower than λ, the perfusion is the determining factor. The fractional elimination of the gas is given by $Cl/\dot{Q}$, and increases with $\dot{V}_A/\dot{Q}$ but decreases with an increase in λ. As a result, the lung acts as a filter, retaining selectively the gases having a high solubility. When chemical transport of O_2 and CO_2 is taken into account, the behavior of these gases follows the same general pattern of inert-gas exchange. M.M.

A67-38516

EFFECTS OF VENTILATION-PERFUSION INEQUALITY ON ELIMINATION OF INERT GASES.

L. E. Farhi and T. Yokoyama (New York, State University, Dept. of Physiology, Buffalo, N.Y.).

Respiration Physiology, vol. 3, Aug. 1967, p. 12-20. 14 refs. USAF-supported research.

Investigation of inert-gas elimination in a nonhomogeneous lung. Since elimination of an inert gas by the lung depends on the $\dot{V}_A/\dot{Q}$ ratio, elements which have different ratios will show a different pattern of elimination. Alveoli having a high $\dot{V}_A/\dot{Q}$ will contribute to the alveolar dead space. However, the extent of this contribution depends on the gas considered, with gases of low solubility being better suited for detecting these hyperventilated elements. Alveoli with a low $\dot{V}_A/\dot{Q}$ contribute to the venous admixture, the effect being more pronounced with gases of high solubility. Consideration of the simultaneous elimination of two different inert gases makes it possible to draw a $\dot{V}_A/\dot{Q}$ line for these two gases. This can be used to assess $\dot{V}_A/\dot{Q}$ inhomogeneity in terms of a two-compartment model. M.M.

A67-38597 #

DISSOCIATION OF THE BACILLUS BREVIS VAR. G-B DURING THE FLIGHT OF THE VOSKHOD [DISSOTSIATSIIA U BACILLUS BREVIS VAR. G-B PRI POLETE "VOSKHODA"].

G. P. Parfenov and A. A. Lukin.

Kosmicheskie Issledovaniia, vol. 5, July-Aug. 1967, p. 633-635. In Russian.

Discussion of a satellite experiment aimed at studying the induction of dissociation products in Bacillus brevis var. G-B by space-flight factors. The survival ratio of the spores and the appearance of dissociation products and auxotrophic mutants are investigated. No changes in the survival ratio were detected, and no dissociation products and auxotrophic mutants were observed. V.P.

A67-38798 *

DIFFERENTIAL EFFECT OF SODIUM AZIDE ON THE INCORPORATION OF NUCLEIC ACID PRECURSORS INTO CHINESE HAMSTER CELLS IN VITRO.

Jacob Shapira, Peter C. F. Castellani, and Johnnie O. Coleman (NASA, Ames Research Center, Moffett Field, Calif.).

Life Sciences, vol. 6, no. 16, 1967, p. 1741-1748. 13 refs.

Demonstration that sodium azide can profoundly alter the nucleic-acid metabolism of diploid Chinese hamster fibroblasts grown in vitro. Results are given concerning experiments carried out to determine whether a relatively short incubation with several inhibitors of respiration would have an effect on the incorporation of nucleic acid precursors into the low-molecular-weight and ribonucleic protein fractions. The effects of various concentrations of sodium azide were studied. R.B.S.

A67-38899 *

MICROBIAL INTERACTIONS OF MEN AND THEIR ENVIRONMENT INSIDE A CLOSED SYSTEM.

L. S. Gall (International Business Machines Corp., Federal Systems Div., Space Systems Center, Bethesda, Md.) and P. E. Riely (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.).

Contamination Control, vol. 6, Sept. 1967, p. 20, 21. Contract No. NAS 9-4172.

Investigation of the problem of microbial interaction in a closed system by simulating space-flight conditions. Studies were done with eight young male subjects who were confined for a period of 34 days, two in a control area and six in a chamber that was at 5 psia with 100% oxygen for 20 days and at ambient the remaining 14 days. The results of these tests showed that the types of micro-organisms present in the environmental areas as the tests proceeded reflected the hardier types of micro-organisms isolated from the subjects, such as staphylococci, streptococci, and soliform-type gram nega-

tive rods. In addition, diphococci, bacilli, and slender gram negative rods were found in the environment. The degree of crowding seemed to influence the results of the buildup, both with respect to numbers and types of micro-organisms. M.F.

A67-39060
CENTRAL FACTOR IN AUDITORY FATIGUE - AN ARTIF
G. Richard Price and Lynn C. Oatman (U.S. Army, Human Engineering Laboratories, Aberdeen Proving Ground, Md.).
Acoustical Society of America, Journal, vol. 42, Aug. 1967, p. 475-479. 7 refs.

Description of three experiments which were made to further study the influence of central factors on pure-tone auditory fatigue noted by Wernick and Tobias. Experiment 1 replicated the Wernick and Tobias study and produced similar data. Experiments 2 and 3 were concerned with the effects of the changes suggested by observations made during experiment 1. The results indicated that, if the subjects could resume postexposure threshold tracking without being required to do something else simultaneously, the differences between the experimental groups disappeared. Thus, the effect interpreted earlier as being the influence of a central factor, seems to be a procedural artifact. This interpretation, with one exception, is consistent with the procedure and data of previous experiments. M.M.

A67-39097 *
A DIFFUSION MODEL OF PERCEPTUAL MEMORY.
R. A. Kinchla (McMaster University, Hamilton, Ontario, Canada) and F. Smyzer (California, University, Berkeley, Calif.).
Perception and Psychophysics, vol. 2, no. 6, 1967, p. 219-229. 10 refs.
Grant No. NGR-33-016-067.

A model is presented of the perceptual process through which an observer compares two consecutively observed stimuli. Emphasis is placed on the manner in which a memory of the first stimulus is maintained until the comparison stimulus is observed. It is argued that the role of this perceptual memory process provides the primary distinction between detection and recognition tasks. Experiments are reported in which (1) the observer is asked to judge the similarity in position of two points of light presented serially in a dark room and (2) the observer judges the similarity in loudness of two serially presented tones. The visual experiment is discussed in relation to the analysis of autokinesis and involuntary eye movements, while the auditory experiment is shown to have special relevance to the issue of time-order errors. (Author)

A67-39099 *
FORGETTING OF A SIMPLE MOTOR TASK.
Wayne L. Fox and Cecil A. Rogers, Jr. (Arizona, University, Tucson, Ariz.).
Psychonomic Science, vol. 6, no. 6, 1966, p. 301, 302. 7 refs.
Grant No. NGR-03-002-091.

Severe motor-skills forgetting was shown in a simple printing task. Decrements were attributed in large part to retroactive interference produced via a training procedure previously proposed by Rogers (1966). Interpretation was in terms of conflicting sets. Inadequacies of traditional indices of motor forgetting were emphasized. (Author)

A67-39100 *
EFFECTS OF REINFORCEMENT INTERVALS IN PAIRED-ASSOCIATE LEARNING.
L. Keller, W. J. Thomson, J. R. Tweedy, and R. C. Atkinson (Stanford University, Stanford, Calif.).
Journal of Experimental Psychology, vol. 73, Feb. 1967, p. 268-277. 16 refs.
Grant No. NGR-05-020-036.

The length of the reinforcement interval (RI) in paired-associate learning was studied using a within-subjects design to eliminate confounding of presentation rate with the time between successive presentations of the same item. Forty subjects were run for 15 trials on a 24-item list with RIs of 1/2, 1, 2, and 4 sec. Results indicated: (1) mean errors were a decreasing function of RI; (2) mean errors for items meeting a criterion were not related to RI; (3) precriterion mean latencies increased slightly for both correct and incorrect response, whereas postcriterion latencies decreased; and (4) the proportion of correct responses decreased as the number of intervening items increased, but the latency measure showed no effect. Several alternative models dealing with RI effects are proposed and evaluated against these data. None of the models prove entirely satisfactory. (Author)

A67-39157 #
A STUDY OF RETRIEVAL TECHNIQUES FOR TETHERED ASTRONAUTS.
Corrado R. Poli (USAF, Air University, Institute of Technology, Wright-Patterson AFB, Ohio).
International Federation of Automatic Control, Symposium on Automatic Control in Space, 2nd, Vienna, Austria, Sept. 4-8, 1967, Paper. 21 p.

Mathematical models are developed and used for investigating the feasibility of three distinct retrieval techniques currently under consideration for future extravehicular operations: the constant line tension technique, the constant reel-in speed technique, and the "anchor-mass" technique. The models for these retrieval systems are obtained by writing the rotational equations of motion for a rigid body satellite, the translational equations of motion for a "point-mass" man and a "point-mass" anchor, and the equations of constraint, which relate the distances between the astronaut and the anchor mass. The trajectory of the astronaut with respect to the vehicle, the forces of constraint acting on the astronaut, and the angular-velocity components of the vehicle are obtained by solving the equations using various initial conditions for the astronaut, the anchor mass, and the vehicle. Line-wrap, excessive spacecraft rotation rates, large constraint forces, and excessive terminal velocities of the astronaut cause these retrieval techniques to be considered unacceptable for long retrieval distances. For short retrieval distances, the problem of line-wrap may be minimized. (Author)

A67-39163 #
SPEECH AS THE CONTROL ELEMENT.
F. F. Stucki (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Research Laboratories, Palo Alto, Calif.) and G. G. Richards (Stanford University, School of Medicine, Speech Research Laboratory, Palo Alto, Calif.).
International Federation of Automatic Control, Symposium on Automatic Control in Space, 2nd, Vienna, Austria, Sept. 4-8, 1967, Paper. 9 p. 7 refs.

A ferrite microtransducer was used as the pressure-sensing element in a preliminary study of speech articulation to determine the capability of such a transducer to detect minute changes in tongue-palatal contact pressure, duration, and location. The total system used is capable of detecting certain of those physiological characteristics which are fundamental in speech production and crucial to speech perception. With certain modification and refinements, yet unspecified, this system could be part of larger systems used both in transmitting speech and in controlling and manipulating machines by means of speech signals. (Author)

A67-39280
RELIABILITY AND ANTHROPOTECHNICAL VIEWPOINTS [ZUVERLÄSSIGKEIT UND ANTHROPOTECHNISCHE GESICHTSPUNKTE].
K. Schürger and G. Schweizer (Dornier-Werke GmbH, Friedrichshafen, West Germany).
(Nachrichtentechnische Gesellschaft, Tagung über technische Zuverlässigkeit, Nuremberg, West Germany, Apr. 1967, Paper.) Luftfahrttechnik Raumfahrttechnik, vol. 13, Aug. 1967, p. 175-179. 8 refs. In German.

Investigation of new methods to establish anthropotechnical reliability during the operation of complex systems, as required in air and space travel. A man is able to fulfill his tasks reliably only if he is qualified to read all important instruments and to properly react on the information thus obtained under all operational conditions and at any moment. For anthropotechnical tests of reliability, therefore, statements concerning the amount of information which a man can assimilate in a unit of time are of importance. Methods based on this principle are gradually introduced into air- and space-travel techniques; these methods are also adaptable for use in other operational systems. P.v.T.

A67-39286 #
SOME PROBLEMS OF PROTECTION FROM RADIATION DURING SPACE FLIGHTS. III [ÜBER EINIGE PROBLEME DES STRAHLENSCHUTZES BEI KOSMISCHEN FLÜGEN. III].
H. Swart.
Astronomie und Raumfahrt, no. 2, 1967, p. 57-64. 7 refs.
In German.

Discussion of four approaches to providing protection from cosmic rays: shielding, observation and warning, dosimetry, and medical protection. Shielding is noted to be of primary importance; specifically an astronaut should not be exposed to more than 25 rem, with an emergency limit of 200 rem. It has been suggested that the solid shielding now in use be replaced with magnetic fields or plasma clouds. Cosmic-ray observations and warnings are, as a rule, accomplished by satellites, space probes, and radio astronomy ground stations, with the purpose of ascertaining whether a space flight is advisable under existing conditions of radiation. Dosimeters are placed onboard the spacecraft and are carried by the individual astronauts, to measure cosmic rays within the spacecraft and to indicate when additional shielding is required. Medical protection and treatment are largely symptomatic: vitamis, antibiotics, antishock remedies, antihistamines and sedatives are recommended according to individual requirements. P.v.T.

A67-39318 *
SHORT-TERM RECALL OF PAIRED-ASSOCIATES AS A FUNCTION OF THE NUMBER OF INTERPOLATED PAIRS.
J. W. Brelsford, Jr., L. Keller, R. M. Shiffrin, and R. C. Atkinson (Stanford University, Stanford, Calif.).
Psychonomic Science, vol. 4, 1966, p. 73, 74.
Grant No. NGR-05-020-036.

Results of a study of short-term memory of paired-associates, using a continuous technique. For 4, 6, or 8 stimuli, recall was found to be a decreasing function of the number of pairs of items interpolated between study and test on a given item. Reliable differences between the functions for 4, 6, and 8 stimuli were found. (Author)

A67-39334 #
THE POSSIBILITY OF THE ORIGIN OF A BACTERIAL THREAT TO THE CREW DURING A PROLONGED SPACE FLIGHT [MOŻLIWOŚĆ POWSTANIA ZAGROŻENIA BAKTERYJNEGO U ZAŁOGI PODCZAS DŁUGOTRWAŁEGO LOTU KOSMICZNEGO].
Michal Jendyk.
Astronautyka, vol. 10, no. 3, 1967, p. 16-18. 8 refs. In Polish.

Description of the possible sources of a microbic shock in the human organism during a prolonged space flight. Such a microbic shock is caused by a violent and rapid reaction of the intestinal-tract flora on the organism and is brought about by a qualitative and quantitative variation in the flora due to prolonged consumption of foods lacking sufficient variety. The changes in the quantity and variety of the bacteria are further influenced by infection with micro-organisms contained in the foods. Subsistence on a diet lacking in bacterial content causes not only changes in the intestinal flora but also significant morphological disturbances, blood damage, and vitamin deficiencies. Prevention of these effects necessitates consumption of pills containing normal intestinal flora selected in a proportional composition. T.M.

A67-39556 *
LIFE IN THE CLOUDS OF VENUS?
Harold Morowitz (Yale University, Dept. of Molecular Biophysics, New Haven, Conn.) and Carl Sagan (Harvard University, Harvard College Observatory; Smithsonian Institution, Smithsonian Astrophysical Observatory, Cambridge, Mass.).
Nature, vol. 215, Sept. 16, 1967, p. 1259, 1260. 14 refs.
NASA-supported research.

Speculation on an indigenous biology in the clouds of Venus involving the stirring up of minerals from the planet's surface. A postulated photosynthetic organism could reside just below the Venus clouds, or in the lower cloud deck. Water would be collected either as rain or by contact with the droplets, and minerals blown up from the surface could be captured on the sticky underside of the organism, and ingested by pinocytosis. B.B.

A67-39587 *
RECALL OF TWO MESSAGES PRESENTED IN SEQUENTIAL ALTERNATE WORDS.
Anne W. Story (NASA, Electronics Research Center, Cambridge, Mass.).
(American Psychological Association, Annual Convention, 74th, New York, N.Y., Sept. 2-6, 1966, Paper.)
Perceptual and Motor Skills, vol. 25, 1967, p. 53-64. 7 refs.

Discussion of an experiment designed to investigate the recall of two messages displayed in sequential alternate words. An attempt was made to determine whether the total number of words reported and the number of words correctly sequenced from one message were related to the total number of words reported and the number of words correctly sequenced from the other message. A secondary purpose of the experiment was to investigate the effect on recall of the presentation of two identical words at different times in the same series. It was noted that in the transmission of two combined messages, when only one word can be presented at a time, the first word displayed acquires prime importance. M.F.

A67-39593
HEMODYNAMIC RESPONSES OF CONSCIOUS DOGS DURING EXPOSURE TO VARIOUS +Gx/BACK ANGLE COMBINATIONS.
David D. Michie (Technology, Inc., Life Sciences Div., San Antonio, Tex.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 883-889. 16 refs.
Contract No. AF 41(609)-2939.

Study ot determine the optimum angle for positioning astronauts so that maximum $+G_x$ levels could be tolerated with minimum distortion of cardiovascular functions. Consciuous dogs, previously instrumented with ultrasonic flow probes (pulmonary artery, thoracic aorta common carotid artery) or for pressure measurements (common carotid artery), were subjected to centrifugation of various levels and at different back angles. It is concluded that there is no single optimum back angle. Rather a back-angle range between $+10^{o}$ through -10^{o} appears to permit minimum distortion of cardiovascular function during a 90 sec exposure to $+G_x$ forces ranging from 1 through 10 with G_z components varying from -0.75 through +2.7. P.v.T.

A67-39594
EXPERIMENTAL COMPARISON OF TRAUMA IN LATERAL ($+G_y$), REARWARD FACING ($+G_x$), AND FORWARD FACING ($-G_x$) BODY ORIENTATIONS WHEN RESTRAINED BY LAP BELT ONLY.
Richard G. Snyder, Clyde C. Snow, Joseph W. Young, George T. Price (Federal Aviation Administration, Civil Aeromedical Institute, Oklahoma City, Okla.), and Peter Hanson (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N. Mex.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 889-894. 20 refs.

In the study, 24 anesthetized Savannah baboons (Papio cynocephalus) restrained with a lap belt were subjected to a controlled series of lateral impacts at entrance velocities ranging from 36.4 ft/sec (15 g) to 88.2 ft/sec (44 g), 1200 g/sec to 5900 g/sec rate of onset, for total durations of 0.076 to .100 sec. Sixteen lateral ($+G_y$) tests were run with four forward-facing ($-G_x$) and four rearward-facing ($+G_x$) controls. Gross and microscopic autopsies were performed. Pathology was found to be significantly higher in lateral impact. Ruptured bladders and uteri, adrenal hemorrhage, and subdural and epidural hemorrhage occurred frequently. A major finding, with unexplained etiology, was marked pancreatic hemorrhage most typical of the lateral impact. Under these test conditions, both survival and injury tolerance levels were found to be lower in the lateral ($+G_y$) body orientation, indicating lap belt restraint alone does not provide adequate body protection. (Author)

A67-39595
HEAT STRESS IN ARMY PILOTS FLYING COMBAT MISSIONS IN THE MOHAWK AIRCRAFT IN VIETNAM.
J. T. Joy (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.).
(Federation of American Societies for Experimental Biology, Annual Meeting, Chicago, Ill., Apr. 18, 1967, Paper.)
Aerospace Medicine, vol. 38, Sept. 1967, p. 895-900. 8 refs.

Study of 24 subjects for water losses after flying 17 missions as crew members in Mohawk aircraft in Vietnam in June 1966. In seven of these missions, seven pilots and the investigator also had rectal and skin temperature measured during flight. Ground and cockpit WBGTs (wet bulb globe temperatures) were measured. Low level visual reconnaissance flights during the day were found to be the most stressful, with water losses (sweat) of 405 ml/hr man, while rectal and skin temperatures and heat gains were well compensated by the high sweat rates. An average of 82 kcal/hr man of transient heat gain was acquired from the environment, and an average of 209 kcal/hr man of heat was contributed to the cockpit environment. Evening and night missions were found to cause modest dehydration. At least for the variables measured, actual combat circumstances did not appear to cause additional physiological strain. In-flight water drinking, cockpit ventilation, and lighter clothing were recommended to reduce air crew discomfort and restore homeostatic conditions. These suggestions were implemented by command and appear to have alleviated the problem. P.v.T.

A67-39596
EJECTION CAPABILITY VERSUS THE DECISION TO EJECT.
Richard M. Chubb, George C. Braue, and Robert H. Shannon (USAF, Systems Command, Life Sciences Div., Norton AFB, Calif.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 900-904.

Description of some recent changes in ejection equipment installed in certain USAF aircraft to improve the low-altitude capability of the system to the extent that ejection from the runway is possible. Experience has shown that the advent of such improved systems leads to an increase in the number of low altitude ejections as compared to the total number of ejections. Even with the better systems, the fatality rate is higher at extremely low altitude than at higher altitude, largely as a result of unfavorable aircraft altitude or sink rate. This leads to the paradoxical situation in which the best systems have the worst overall success rate. If having a better system encourages pilots to attempt escape from a situation in which they previously had no hope of escape, this is considered good. If having a better system encourages them to delay ejection, the overall effect is bad. Statistics relative to this problem are presented, and the relative importance of these two factors is discussed. Other possible reasons for the observed effect of improved systems on the altitude of ejection are suggested. P.v.T.

A67-39597
SENSORY DISCRIMINATION AND ATTITUDES TOWARD WATER RECLAIMED FROM URINE.
Stuart O. Parsons, Richard J. Shavelson, and Joseph L. Seminara (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 905-908. 8 refs.

In order to determine if there were any psychological, or preference factors associated with the consumption of water reclaimed from urine, 36 subjects were asked to discriminate tap water, distilled water and water reclaimed from urine. It was found that the subjects could distinguish tap water from either distilled water or water reclaimed from urine, but they could not distinguish distilled water from water reclaimed from urine. No differences in the ability to discriminate were found to be associated with smoking, sex, or water temperature. In response to a questionnaire, the subjects indicated that the use of water reclaimed from urine would be acceptable for space flight consumption. (Author)

A67-39598
AEROMEDICAL RESPONSIBILITIES IN AIRCRAFT RELIABILITY.
Thomas A. Collins and Anchard F. Zeller (USAF, Systems Command, Life Sciences Div., Norton AFB, Calif.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 908-911.

The study presents the historical trends of Air Force accidents for the past 15 years and documents the increasing importance of the maintenance/material area. Because of their higher performance and lesser degree of redundant reliability caused by fewer engines, fighter aircraft are particularly susceptible to maintenance and servicing errors. Evaluation of these errors indicates that they involve all echelons of maintenance and involve a great variety of specific omissions or faulty commissions. The flight surgeon and his associates must place additional emphasis on the problems of the maintenance man, to insure that his capabilities are brought fully to bear. An aircrew effectiveness program can never be totally effective if aircraft are not mechanically reliable and if pilots lack confidence in their aircraft. (Author)

A67-39599 *
THERMAL COMFORT ZONES FOR HELIUM-OXYGEN ATMOSPHERES AT REDUCED PRESSURES.
M. S. Bonura, R. E. Snyder, and W. J. White (McDonnell Douglas Corp., Douglas Aircraft Co., Missile and Space Systems Div., Advanced Biotechnology and Power Dept., Life and Environmental Systems Branch, Santa Monica, Calif.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 912-916. 6 refs.
Research supported by the Douglas Independent Research and Development Program; Contract No. NASw-1371.

Thermal conductivity for a helium-oxygen mixture is 2.5 times greater than the conductivity of a nitrogen-oxygen mixture at 7 psia. A direct result of this difference is that the convective heat loss from man is higher in a helium atmosphere. Therefore, thermal comfort zones in helium should show an elevation in temperature. Measurements of human comfort zones at pressures of 5, 7, and 10 psia using a random walk technique were made in a space-cabin simulator. Air velocities (20, 50, and 80 ft/min), clothing (0.0 and 0.7 clo), and atmosphere diluents (helium and nitrogen) were systematically varied within the allowed time span. The data show that the midpoint of the comfort range for the clothes subject (0.7 clo) is highest for $He-O_2$ ($85 \pm 9^{\circ}F$) at 7 psia, lowest for N_2-O_2 ($78 \pm 6^{\circ}F$) at both 5 and 7 psia, and midway between these extremes for $He-O_2$ ($82 \pm 9^{\circ}F$) at 5 psia. For the subject at zero clo value, the midpoints of the comfort range show no difference. The low air velocities used in the study exerted a small inconsistent effect at all pressures, compositions, and clo values. (Author)

A67-39600
EFFECT OF RAPID DECOMPRESSION ON LYMPH PRESSURE OF THE DOG.
H. M. Liu and H. S. Fang (National Taiwan University, College of Medicine, Dept. of Physiology, Taipei, Taiwan).
Aerospace Medicine, vol. 38, Sept. 1967, p. 916, 917.

Rapid decompression of 22 dogs from a pressure of 1 atm to an ambient pressure of 210-30 mm Hg resulted in an increase of lymph pressure. The extent of increase varied with the rate and range of decompression. In some instances, the rise in lymph pressure occurred in two phases: an immediate phase due to rapid decompression and a delayed phase presumably due to the deepening of breathing induced by hypoxia. (Author)

A67-39601
LUNG CHANGES RESULTING FROM PROLONGED EXPOSURE TO 100 PER CENT OXYGEN AT 550 MM. Hg.
George H. Kydd.
Aerospace Medicine, vol. 38, Sept. 1967, p. 918-923. 15 refs.

Rats exposed to 100% oxygen at 500 mm Hg for 30 days survive and show no respiratory or other difficulty during the exposure. Histological examination of the lung tissue indicates that the blood vessels of the lung have undergone a change in structure during the exposure. The results suggest that the media is eroded as evidenced by thin vessel walls and by streaming of the media into the adventitia. There is also evidence of hypertrophy and/or hyperplasia in the vessel walls. (Author)

A67-39602 *
ALTERED PULMONARY HEMODYNAMICS FOLLOWING EXPERIMENTAL DECOMPRESSION SICKNESS.
A. T. K. Cockett and Ray T. Kado (Harbor General Hospital, Dept. of Surgery/Urology, Torrance; California, University, School of Medicine, Space and Biology Laboratories, Los Angeles, Calif.).
Aerospace Medicine, vol. 38, Sept. 1967, p. 923-925. 7 refs.
Grant No. NsG-237-62; Contracts No. NAS 2-2151; No. NR-00014-66-C-0295.

A lethal overcompression-decompression model for dogs is presented. A new diagnostic technique - radioisotopic lung scanning -

is described. Cold areas (regions of experimental gaseous aeroemboli) are described; they are found after subjecting mongrel dogs to depths of 165 ft for 1 hr. The pathologic physiology in the pulmonary vascular bed before and after experimental decompression is described. Collateral circulation developing some 48 hr after decompression probably accounts for the disappearance of the cold areas on sequential scans. The importance of maintaining an effective circulating volume after decompression is again emphasized. Complete recovery in the treated group is seen. Recompression is deliberately withheld. (Author)

A67-39603 *

BLOOD FLOW IN MESENTERIC ARTERY OF CHIMPANZEE, MONITORED VIA RADIO TELEMETRY.

Dean L. Franklin and Robert L. Van Citters (California, University, Scripps Clinic and Research Foundation, Div. of Biomedical Engineering, La Jolla, Calif.; Washington, University, Regional Primate Research Center and Dept. of Physiology and Biophysics, Seattle, Wash.).

Aerospace Medicine, vol. 38, Sept. 1967, p. 926-931. 22 refs. Research supported by the Washington State Heart Association and NASA; PHS Grants No. HE-08433; No. HE-08337; No. FR-00166.

The Doppler ultrasonic telemetry flowmeter was used to monitor mesenteric blood flow in an adult male chimpanzee for 24 hr, while he moved freely about an outdoor enclosure. The resting flow was about 600 ml/min or 12 ml/kg-min and varied less than +20% during ordinary activity such as eating, sleeping, and changes in posture. When he was startled from sleep, flow decreased transiently. When he was excited, there was a sustained increase of about 25%. Flow decreased most during defecation; this decrease appeared to result from mechanical compression of venous outflow rather than vasomotor activity. In general, flow in the mesenteric bed was stable, changed little during activity, and never approached zero. These observations agree with earlier studies of active dogs and baboons. (Author)

A67-39604 #

ROLE OF TRANSPHARYNGEAL PRESSURE GRADIENTS IN DETERMINING INTRAPULMONARY PRESSURE DURING IMMERSION.

Leonard J. Thompson and Michael McCally (Indiana University, Cardiopulmonary Laboratory, Bloomington, Ind.; USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Environmental Medicine Div., Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 38, Sept. 1967, p. 931-935. 10 refs. Research sponsored by the Indiana University Foundation; Contract No. AF 33(616)-8378.

The role of transpharyngeal pressure gradients in setting intrapulmonary pressures was studied in eight seated subjects, immersed in thermally neutral water (33 to 34°C). When breathing through a mouthpiece or a facemask, subjects chose pressures which were negative relative to the sternal notch (range 0 to -8 cm H_2O). When a helmet alone was used, breathing pressures ranged from -5 to +20 cm H_2O, suggesting that when no transpharyngeal pressure gradient is present, discrimination in choosing a breathing pressure is reduced. When breathing from a mouthpiece inside a helmet, an increase in breathing pressure resulted in the subject choosing an increased helmet pressure thus minimizing the transpharyngeal gradient (mean range 1 to 7.5 cm H_2O). A wide range of transthoracic pressure gradients (-30 to +40 cm H_2O) is subjectively more comfortable than a slight increase in transpharyngeal gradient (up to 7.5 cm H_2O). (Author)

A67-39605 *

VESTIBULAR AND NONVESTIBULAR INFORMATION IN JUDGMENTS OF ATTITUDE AND CORIOLIS MOTION IN A PILOTED FLIGHT SIMULATOR.

Brant Clark and John D. Stewart (NASA, Ames Research Center, Moffett Field; San Jose State College, San Jose, Calif.).

Aerospace Medicine, vol. 38, Sept. 1967, p. 936-940. 12 refs.

The purpose of the study was to investigate the modulation of vestibular responses by tactual and proprioceptive stimuli in the perception of motion and cockpit attitude in a rotating flight simulator. Eight observers were rotated in the cockpit of a five-degree-of-freedom simulator 30 ft from the center of rotation. During the rotation, the cockpit or the head and body was pitched 35 or 70° to produce Coriolis accelerations. Head nodding was also studied. The reported Coriolis rotations were very similar for the three methods of producing head motion, and it was concluded that Coriolis rotation in this situation was not modulated in any significant way by the other sensory information available to the observers. On the other hand, the estimates of the attitude of the cokpit while the head and body pitched down were very similar to those when the body was pitched up. For both conditions, the estimates of cockpit attitude indicated that the nose of the cockpit was judged to be lower than its deviation from the resultant force during rotation at the lower velocities, while at 12 rpm the estimates were quite accurate. The data suggest, therefore, that the estimates of attitude are dependent upon tactual and proprioceptive information as well as upon information from the vestibular mechanism. (Author)

A67-39606

INFLUENCE OF AIR TRAVEL EAST-WEST AND VICE-VERSA ON CIRCADIAN RHYTHMS OF URINARY ELIMINATION OF POTASSIUM AND 17-HYDROXYCORTICOSTEROIDS.

E. Lafontaine, J. Lavernhe, J. Courillon, M. Medvedeff, and J. Ghata (Compagnie Nationale Air France, Paris, France).

Aerospace Medicine, vol. 38, Sept. 1967, p. 944-947. 11 refs.

The influence of air travel east-west and vice versa on circadian rhythms of urinary potassium and 17 hydroxycorticosteroids was measured on flights from Paris to Anchorage and Achorage to Paris. The urinary potassium and 17 hydroxycorticosteroids which, taking the average of the subjects involved, show the lowest standard deviation and the clearest circadian variation, seem particularly interesting for studying the biological effects of time-zone changes. After a quick round-trip with a 20-hr exposure to a negative time-zone change of 11 hr, the circadian eliminatory rhythm of potassium and 17 hydroxycorticosteroids immediately becomes concordant with the pre-existing reference rhythm again. During a journey with a 5-day exposure to a negative time-zone change of 11 hr, the circadian eliminatory rhythm of these same elements begins to adapt itself to local time on the third day; this adaptation is complete on the fifth day, the excretive rhythms then being in opposition to the pre-established reference rhythms. (Author)

A67-39607

EXPERIMENTAL BLACKOUT AND THE VISUAL SYSTEM.

T. D. Duane (Jefferson Medical College, Dept. of Ophthalmology, Philadelphia, Pa.).

Aerospace Medicine, vol. 38, Sept. 1967, p. 948-963. 133 refs. Research supported by NIH Grants No. NB-04233; No. NB-05135; No. NB-5456; No. GRS-FR-5414.

Integration of the results of 15 years of experimentation upon the effects of distal and local ischemia on the visual systems of man and lower animals. Blackout has been produced by centrifugation and ophthalmodynamometry. Changes in the visual system have been observed through direct observation - e.g., ocular movements, pupillary reflexes, and ophthalmoscopy; through subjective responses - e.g., visual acuity, campimetry; and by indirect recordings - e.g., ERG, EEG, and cerebral blood flow. The studies are correlated to other parameters of neurophysiologic responses in an attempt to outline the general problem of blackout. P.v.T.

A67-39847

RESEARCH IN VISUAL PERCEPTION FOR CARRIER LANDING.

Aaron Hyman (Sperry Rand Corp., Sperry Gyroscope Div., Human Factors Dept., Great Neck, N.Y.).

Sperry Engineering Review, vol. 20, no. 2, 1967, p. 2-7.

Discussion of the importance of the visual aspects of carrier landing and description of a research program sponsored by the Physiological Psychology Branch of the ONR. The aim of the program is to evaluate the effects of some of the key visual factors on the pilot's ability to make critical visual judgments during carrier landing. Day and night operations are considered in these studies. Quantitative data covering the visual judgments of position and aim point made by pilots during carrier landing have been obtained. The pilots' perceptual performance dropped at night in the impoverished visual situation. These preliminary studies have been based on calm sea conditions, without ancillary visual aids on the carrier.

The effects of ship motion and the presence of the Fresnel lens optical landing system are still to be investigated. The composite data will permit evaluation of the individual influences of each of the parameters affecting a pilot's judgment. P.v.T.

A67-39848
TARGET DETECTION IN VISUAL SEARCH.
Theodore Gold (Sperry Rand Corp., Sperry Gyroscope Div., Human Factors Dept., Great Neck, N.Y.).
Sperry Engineering Review, vol. 20, no. 2, 1967, p. 12-16.

Evaluation of the usefulness of devices to help a pilot to detect aircraft visually, with the special purpose of determining if any systematic relationship exists between detection functions obtained under fixated conditions and in visual search. The results of the study indicate that relationships exist between detection probabilities under fixated and search conditions for targets less than 6' in diam. Thus it is possible to predict the search detection frequency of one target if the search detection frequency of another is known, provided that they have an angular subtense less than 6' and similar fixated detection frequencies. It is proposed that this general rule may apply to all targets within the Ricco region of the eye. P.v.T.

A67-39849
HUMAN FACTORS AND VIPRE FIRE.
Charles L. Keller (Sperry Rand Corp., Sperry Utah Co., Salt Lake City, Utah).
Sperry Engineering Review, vol. 20, no. 2, 1967, p. 17-23.

Description of the VIPRE-FIRE (VIPRE = VIsual PREcision): a simplified fire control system designed primarily for helicopter applications. The most significant feature of VIPRE-FIRE is the use of the helmet sight, which gives the pilot or copilot-gunner the ability to direct his fire without requiring the use of his hands. The helmet sight measures the angles of the operator's head as he looks at the target, and directs the guns accordingly. VIPRE-FIRE also inserts fire control corrections for the two predominant error sources: aircraft velocity jump and projectile gravity drop. This fact, combined with the convenience of sighting and tracking, gives the VIPRE-FIRE equipped armament system the potential of significant improvement in accuracy and ease of use above and beyond that attainable with existing, operational helicopter armament systems. P.v.T.

A67-39889
THE SPACECRAFT ATMOSPHERE.
Space/Aeronautics, vol. 48, Aug. 1967, p. 71-82.

Analysis of the problem of the composition of the spacecraft atmosphere. Physiological, engineering, and fire and blast criteria for atmosphere selection are presented. Helium and nitrogen are evaluated as possible oxygen diluents, and it is shown that neither gas offers obvious advantages compared to the other. Block diagrams of several systems designed for the recovery of oxygen from CO_2 are presented. R.B.S.

A67-40087 *#
SOME EFFECTS OF MOTION CUES ON MANUAL TRACKING.
Laurence R. Young (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Cambridge, Mass.).
(NATO-AGARD, Symposium on the Human Operator in Aircraft and Spacecraft Control, Paris, France, Sept. 5, 6, 1966, Paper.)
Journal of Spacecraft and Rockets, vol. 4, Oct. 1967, p. 1300-1303. 21 refs.
Grant No. NsG-577.

Discussion of experiments on control of inverted pendulums and VTOL's with and without motion cues. Tests of labyrinthine defective patients on similar tasks demonstrated the critical importance of vestibular inputs. The second situation required rapid adaptation to controlled element failures in a simulated blind landing experiment. Other tests showed motion effects to be important in a class of flexible booster-control problems. These results are combined with many comparisons of fixed-base and moving-base flight experiments in the literature to arrive at some general conclusions regarding the effects of motion cues on tracking It is found that motion cues are more helpful with unstable dynamics than with lightly damped oscillatory vehicles. Moving-base simulation yields closer agreement with flight experience than fixed-base simulation, especially in marginally stable or difficult vehicles. M. F.

A67-40154
A METHODOLOGY TO ANALYZE AND EVALUATE CRITICAL HUMAN PERFORMANCE.
M. A. Barone (Grumman Aircraft Engineering Corp., Bethpage, N.Y.).
IN: AMERICAN ASTRONAUTICAL SOCIETY, SOUTHEASTERN SYMPOSIUM ON MISSILES AND AEROSPACE VEHICLES SCIENCES, HUNTSVILLE, ALA., DECEMBER 5-7, 1966, PROCEEDINGS. VOLUME 2. [A67-40134 22-31]
Symposium sponsored by the American Astronautical Society, the University of Alabama, NASA Marshall Space Flight Center, and the Missile Command of the U.S. Army.
Huntsville, Ala., American Astronautical Society, Southeast Section, 1966, p. 72-1 to 72-15.

Description of a method of evaluating and analyzing critical human performance for the purpose of rating the man-machine interface. The program has been designed to control and minimize the natural subjectivity associated with evaluation programs. The reliability is expressed in terms of the probable potential human error and the probable significance of the rated reliability. The typical approach is to: (1) analyze the system or task, (2) select evaluation factors, (3) establish and prevalidate a rating manual or check list, (4) perform an analysis and an evaluation, and (5) estimate potential comparison studies. The program employs system, task, and factor analysis in conjunction with correlated actual and/or experimental data to evaluate and establish a rated criticality rank of human performance. The criticality is based on the probability of successful human performance. The different stages of the technical approach are described in detail. T.M.

A67-40340
LIFE SUPPORT.
H. F. Orton (United Aircraft Corp., Hamilton Standard Div., Space Systems Dept., Windsor Locks, Conn.).
Space/Aeronautics (Research and Development Issue), vol. 48, July 31, 1967, p. 107-111.

Discussion of regenerative and reclamation techniques for food, water, and oxygen which may be used on future earth-orbital and planetary space flights. Air evaporation, vapor compression, membrane diffusion, and electrodialysis (the four main methods of reclaiming water from urine) are described, and the reduction and removal of CO_2 is detailed. Alternatives to makeup hydrogen and the control of contaminents are considered. B.B.

A67-40410
RESOLUTION, CONTRAST, AND TIME FACTORS IN VISUAL SEARCH.
B. M. Hillmann (Radio Corporation of America, Defense Electronic Products, Aerospace Systems Div., Burlington, Mass.).
IN: ENVIRONMENTAL SCIENCES.
Camden, N.J., Radio Corporation of America, 1967, p. 43-46. 5 refs.

Discussion of the human factors involved in a successful visual target acquisition under realistic conditions of viewing. Results of conducted studies indicate considerable differences between the detection and recognition processes. It is demonstrated that detection thresholds are less dependent upon target size than are recognition thresholds. Resolution and contrast requirements are shown to differ, depending upon the particular visual task. The aperture-response characteristic of an imaging system is considered as a primary factor in determining target-recognition capability. Time factors involved in the visual search process are examined under static and dynamically changing conditions. The necessary duration of viewing to completely scan a scene is determined analytically on the basis of the eye's fixation time and the angular size of the display at the observer's viewing distance. The need for additional human-factors information about visual search is stressed. T.M.

A67-40532
SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967. 225 p. In English, Russian, French, and German.

CONTENTS:

A67-40533 #
MECHANISMS OF ADAPTATION TO EXTREMAL CONDITIONS IN SIMULATION TESTS [MEKHANIZMY ADAPTATSII K EKSTREMAL'NYM VOZDEISTVIIAM V PRAKTIKE EKSPERIMENTOV].
P. K. Isakov.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 17-27. In Russian.

Discussion of simulation techniques used to determine the admissible short-term (instantaneous) effects of extremal flight factors on the human organism. Experiments are described in which various animals and human subjects were subjected to such effects as exposure to rapid air flows, parachuting, ejection, and instantaneous decompression. Tables are given showing the results of such tests in terms of the systolic rate, respiratory rate, pulmonary ventilation, oxygen consumption, the latent period of conditional motor reflexes to excitation by light, and the dependence of the pulse-rate increase accompanying each command prior to the application of a stress and during the application itself. It is seen that an increase in the level of physiological functions immediately before the application of a stress is a protective measure by which the organism increases its resistance to a given stress. A discussion of the applicability of information obtained in simulation tests to actual conditions indicates that the empirical admissible stress values should be reduced by 20 to 30%. V. P.

A67-40534 #
MAN'S RESPONSE TO A NEW ENVIRONMENT INCLUDING WEIGHTLESSNESS - GEMINI BIOMEDICAL RESULTS.
Ch. A. Berry.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 29-42.

General medical systems review of the biomedical results of the Gemini program. Results are summarized for the skin, central nervous system, respiratory and cardiovascular systems, blood, gastrointestinal system, musculo-skeletal system, etc. It is noted that unlike some of the Russian results, no evidence of altered vestibular function in flight was found; this is in spite of the fact that several astronauts have developed motion sickness while the spacecraft was on the water. Blood findings confirm significant increases in white blood cell counts, as well as the suggestion of a red blood cell mass decrease derived from Gemini 4. Biomedical results of exercise capacity tests, in-flight metabolic data, and extravehicular activity are discussed. Regarding EVA, it is concluded that the peak heart beat rate of 180 per minute is related to the fourfold difficulty in performing tasks. The energy expenditure is accounted for by the work involved in simply maintaining a position in order to accomplish a task. R. L.

A67-40535 #
MEDICAL FITNESS FOR FLYING IN MIDDLE-AGED PILOTS.
Ross A. McFarland.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 43-53. 15 refs.

Review of age distribution data, accident statistics, and age-related changes in performance and skill concerning the medical fitness of middle-aged pilots (mostly air transport pilots) to fly. An analysis is made of the age distribution of the 20,269 pilots certificated to fly as of Jan. 1, 1964. Of these, 35% are in the 40 to 44 year old group, with 69% being between 40 and 55 years of age. The safety record of U.S. pilots in relation to age is examined, and it is found that pilots over 55 are liable to be involved in accidents at a rate three times greater than 35-year-old pilots, and that the accident likelihood increases progressively with age beyond 35. A second aspect of the medical fitness to fly is examined, which involves changes in performance and skill, in sensory and mental abilities, and in physiological and psychological stress responses. R. L.

A67-40536 #
THE INFLUENCE OF CHANGES OF THE FEEDBACK UPON THE PERFORMANCE.
J. Hlavsa and O. Landa.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 71-75.

Brief account of an experiment testing what the effect is on the performance of a desired task (stopping a chronometer in the briefest time) when the experimental subjects are (and are not) provided with feedback information regarding the results of their actions. It is concluded that (1) longer reaction times are exclusively conditioned by lack of feedback information, and (2) going from an activity with feedback to one without feedback means increasingly poor performance. R. L.

A67-40537 #
EFFECT OF STARTLE ON PERFORMANCE OF MEN.
M. Vlasák.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.

Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 77-79.

Note on the effect that a sudden, strong stimulus has on the efficiency of pilots' simple visual reaction times and on the strength of muscles fatigued by work. Experimental conditions are described in which a klaxon horn (1.5 sec duration, 400 Hz, 100 db intensity at 1-meter is used as the startle stimulus. It is concluded that the startle stimulus lengthened the simple reaction time for a period of 30 sec in highly reactive individuals and increased the muscle strength of fatigued muscles for about 10 sec in all subjects. R. L.

A67-40538 #
THE EXCRETION OF NEUTRAL 17-KETOSTEROIDS 3-METHOXY-4-HYDROXYMANDELIC ACID, 3-METHOXY-4-HYDROXYPHENYLACETIC ACID AND MUCOPROTEINS IN URINE DURING PRESSURE BREATHING.
V. Doležal, J. Svačinka, J. Luxa, Z. Zemanová, L. Šteffková, and M. Kauders.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 81-89. 17 refs.

Experimental evaluation of the reaction of the adrenal glands of 24 pilots to five types of pressure breathing. Activity of the adrenal glands was indirectly followed by testing for three compounds excreted into the urine: 17-ketosteroids (17-KS), 3-methoxy-4-hydroxymandelic acid (VMA), and 3-methoxy-4-hydroxyphenylacetic acid (HVA). It was established that before stress a significant emotional reaction occurred, which was evident from the amounts of VMA and HVA in the prestress urine. The significantly lower excretion of VMA and HVA in the first poststress urine portion led to the conclusion that during pressure breathing the sympathoadrenal system was blocked by impulses from baroreceptors. Only in the regenerative period did elevated levels of VMA and HVA appear.
R. L.

A67-40539 #
THERMAL LOAD EFFECT ON SOME PHYSIOLOGICAL FUNCTIONS AND MENTAL PERFORMANCE.
J. Štverák.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 91-93.

Brief description of experiments on 48 flight candidates exposed to thermal stress in cockpit environments as measured by the candidates' performance on various psychological tests and by biomedical parameters. Body weight change, rectal temperature, white blood cell count, urine, pulse, etc., were tested during and after exposure to thermal stress at temperatures of 60°C. Psychological testing confirmed that the short-range effect of a dry and hot environment did not cause any decrease of clean performance, as verified by the seven and numeral square tests, although 16 subjects reached the limits of their own tolerance. It was also found that the ability to perform given tasks during 120 min exposure was facilitated. This was explained by the strong positive motivation of the subjects. R. L.

A67-40540 #
METHODICAL NOTES TO THE INFLUENCE OF RADIAL ACCELERATION ON THE CENTRAL NERVOUS SYSTEM.
S. Trojan and L. Jflek.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 95-97.

Brief account of experiments testing the survival times of rats exposed to positive and negative acceleration in a special centrifuge. It is noted that radial acceleration produces stagnant hypoxia (oligemia) and anoxia (ischemia) of all organs, including the central nervous system. A 10-g acceleration was used for most experiments, sufficient to observe oligemia and ischemia but not enough to traumatize the organs. It is found that resistance to negative acceleration is greater than to positive. R. L.

A67-40541 #
ADAPTATION OF THE CENTRAL NERVOUS SYSTEM TO REPEATED ACCELERATION.
L. Jflek and S. Trojan.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 101-103.

Brief description of experiments testing the survival times of rats exposed to radial acceleration. It is found that when rats are exposed to positive accelerations of 10 g for 42 min twice a day at 6-hr intervals from the first day of life, their resistance to ischemia is significantly higher than that of the controls. On the fifth day of life, their survival times are 15 min longer (60% increase) than in nonadapted animals. It is found that the developmentally immature nervous tissue of newborn animals can adapt to repeated acceleration significantly better than the more developed central nervous system tissue. R. L.

A67-40542 #
AGE LIMITATIONS OF FLYING PERSONNEL [VOZRASTNYE OGRANICHENIIA LETNOGO SOSTAVA].
A. Babiichuk.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 111-117. In Russian.

Historical review of the results of investigators in various countries concerning the effect of aging on the professional aptitude of commercial (also military) pilots. It is seen that the conclusions reached in these investigations exhibit substantial discrepancies not only between results separated by time intervals of more than 40 years but also among those of modern investigators. Recent (1963) results of an extensive Soviet investigation of the physical condition and aptitude of two groups of pilots ranging from 30 to 39 and from 40 to 50 years, respectively, are cited. These show that the type of health defects observed is common to all pilots regardless of the type of aviation engaged in. Most of the functional and psychophysiological changes observed in pilots of the older group were not of a pathological nature and did not impair their skill. It is considered important that in determining the fitness of pilots, medical examiners be guided by the physical condition and professional capabilities of the individual pilot, rather than by his age. V. P.

A67-40543 #
OUR EXPERIENCE WITH RENTGENOGRAPHIC KYMOGRAPHY IN EVALUATING THE STATE OF THE CARDIOVASCULAR APPARATUS IN MIDDLE-AGED PILOTS.
J. Volek.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 127-131. 25 refs.

Summary of results of using X-ray kymography of the coronary arteries to visualize functional differences of different age groups. Two groups were tested - pupils at an aircraft school, who were 18-20 years old, and pilots at least 35 years old. X-ray kymography is found to indicate such functional differences sensitively and to be relatively safe for the individuals tested. Representative test results include abnormal findings in the aortic wall in 2.2% of the pupils but in 35.9% of the pilots, a disproportionate incidence that held for all abnormal findings. It is concluded that a positive kymographic finding should be regarded as (1) possibly indicating the presence of pathological changes within the heart muscle, and (2) cause for further examination. R. L.

A67-40544 #
SEVERAL ASPECTS OF LABORATORY PSYCHOPHYSIOLOGICAL ACTIVITY IN THE FLYING PERSONNEL OF VARIOUS AGE.
J. Tůma.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 133-139.

Study of the laboratory psychophysiological efficiency in airmen of different age groups. It is found that pursuit reaction tests do not reveal any age-related changes and that an additional serial motor activity (tapping) disclosed a significant increase in the sup-

pression blocks of airmen in the fifth decade of life. The ability to analyze a complex signal field composed of optical and acoustic signals remains at about the same level in airmen until the fourth decade, but significantly decreases thereafter. Fifth-decade pilots show a worse adaptation to difficulty and mental stress during laboratory examination. Experimental results show that the psychophysiological activity of airmen should be followed with special care beyond age 40.
R. L.

A67-40545 #
THE SPEECH AUDIOMETRY AND HEARING LOSS OF THE MIDDLE AGED PILOTS.
A. Rišavi.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 141-144.

Account of hearing testing by speech audiometry of two experienced pilots with severe hearing loss. Speech audiometry, in which hearing is examined by tests consisting of generally known two-syllable words, gives more realistic data about the real loss of hearing. Each test consists of 60 words selected according to the acoustic values of vowels and consonants. It is found that the capability of individuals with similar hearing loss to reproduce presented words is individually different; over the optimal threshold of hearing the understanding of presented test words could not be improved upon by increasing sound intensity because the loudness of vowels is greater than that of consonants and thus disturbs better understanding.
R. L.

A67-40546 #
AN EXPERIMENTAL CONTRIBUTION TO THE POSSIBILITY OF THE UTILIZATION OF THE RADIOPROTECTIVE COMPOUND AET.
Z. Dienstbier, J. Pospíšil, and J. Kořátko.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 179-184.

Evaluation of the toxicity of the radioprotective compound amino-ethyl-isothiuromium-bromide H Br (AET). AET toxicity was evaluated in rats, mice, and dogs. A definite radioprotective effect is observed at dosages of 200 mg/kg and at 500 to 900 r. However, at lower (100 mg) and higher (320 mg) dosages, only a minimum radioprotective effect is seen. AET effects on the EKG in rats and dogs are compared. It is concluded on the basis of experimental results and literature data that AET is very hazardous for human application due to its high toxicity, low therapeutic application, and side effects on the cardiovascular system. R. L.

A67-40547 #
USE OF RADIOACTIVE ISOTOPES FOR EXPERIMENTAL INVESTIGATIONS IN AVIATION AND SPACE MEDICINE.
S. Barański.
IN: SOME PROBLEMS OF AVIATION AND SPACE MEDICINE.
Edited by P. Levit.
Prague, Karlova Universita, 1967, p. 185-205. 32 refs.

Extensive review of the possibilities opened up by the use of radioisotopes in aviation medicine experiments carried out in Poland. Four types of investigations were conducted involving (1) hemodynamic phenomena and fluids distribution in the organism, (2) metabolism using combined radioisotopic and biochemical techniques, (3) cytophysiological investigations, and (4) the physiology of various organs. Examples of scintillograms and autoradiograms are presented. Specific aviation medicine applications are discussed, including blood studies in hypoxic hypoxia. It is emphasized that because radioisotope methods make it possible to follow phenomena undetectable by classical biochemical, physiological, or morphological methods, they can be used in many investigations related to aviation and space medicine.
R. L.

LC ENTRIES

A67-81878
S–R, R–S INDEPENDENCE AND THE INTERFERENCE POTENCY OF LATENT R–S ASSOCIATIONS.
William A. Johnston (Ohio State U., Columbus).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 511–516. 17 refs.

Eight groups of 16 subjects each were exposed to different four-stage transfer paradigms in an assessment of associative symmetry: E–C, A–B, C–A, A–B; E–C, A–B, C–A, B–A; E–C, A–B, C–D, A–B; E–C, A–B, C–D, B–A; E–F, A–B, C–A, A–B; E–F, A–B, C–A, B–A; E–F, A–B, C–D, A–B; E–F, A–B, C–D, B–A. A stimulus in one list (e.g., A–B) was made "available" by having it serve a response role in another list (e.g., C–A). It was found that (a) R–S is formed during S–R learning, (b) R–S becomes manifest if the stimulus becomes available even after S–R learning, (c) latent and manifest R–S associations (e.g., A–C) can interfere retroactively with S–R (e.g., A–B) recall, and (d) S–R and R–S are independent such that interference of A–B does not affect B–A.

A67-81879
PERCEPTUAL SELECTIVITY IN A VISUAL RECOGNITION TASK.
Howard Egeth (Johns Hopkins U., Baltimore, Md.) and Edward E. Smith (St. Elizabeth's Hosp., Behavioral and Clin. Studies Res. Center, Washington, D. C.).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 543–549. 10 refs.
Contract AF 49(638)-1235.

An attempt was made to localize the mechanism or mechanisms of selectivity through which recognition accuracy may be influenced by instructional sets. Sets of four stimuli (pictures) each were displayed before, after, or before and after the tachistoscopic presentation of a single critical picture. The subjects had to report which one of the four alternatives was used as the critical picture. The stimuli within each set of four alternatives were either highly similar to one another or distinctively different from one another. The results indicated that perceptual processes were capable of being selectively tuned. This result stands in contrast to some previous research which indicated that recognition accuracy was influenced solely by memorial processes.

A67-81880
THERMOREGULATORY RESPONSES IN DISPARATE THERMAL ENVIRONMENTS.
J. F. Hall and F. K. Klemm (Aerospace Med. Res. Labs., Biomed. Lab., Biothermal Branch, Wright-Patterson AFB, Ohio).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 540–544. 8 refs.

Thermoregulatory responses to disparate thermal environments were investigated. Twenty-seven experiments were conducted on six subjects wearing light clothing and exposed supine, then prone, on a net support placed so that the subject's body midline was parallel and within a horizontal plane dividing upper and lower chamber sections. Upper chamber half was maintained at 82.2 and 93.3°C. while lower half was at −67°C. Air temperatures varied from −6.7 to 82 and 93°C., with a range of 15–30°C. at the subject. Following measurements at comfort conditions, 17 skin and rectal temperature, heart rate, and evaporation were measured and recorded every five min. during the 30-min. supine and 50-min. prone exposure. While maximum differences between anterior–posterior mean skin temperature (T_s) of 9.1 and 9.5°C. for the 82 and 93°C. upper chamber temperatures, respectively, were measured, subjects reported thermal comfort. Maximum (T_s) variation at comfort was 4.1°C. Mean evaporative rates of 48.4 and 108.6 g./m.^{2} hr. for the 82 and 93°C. exposures, respectively, indicated light sweating. Heart rate changes were insignificant.

A67-81881
RESPIRATION AND HEART RATE OF SHERPA HIGHLANDERS DURING EXERCISE.
S. Lahiri, J. S. Milledge, H. P. Chattopadhyay, A. K. Bhattacharyya, and Ashis K. Sinha (Presidency Coll., Dept. of Physiol., Calcutta and Christian Med. Coll. and Hosp., Dept. of Thoracic Surg., Vellore, India).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 545–554. 32 refs.
Indian Council of Med. Res. supported research.

Oxygen uptake, ventilatory indices, and heart rate were measured in nine human subjects during exercise performed at an altitude of 4,880 m. Responses of four Sherpa high-altitude dwellers and of five lowlanders were compared at a research station in the Himalaya mountains over a period of eight wk. Oxygen uptake at a given work rate was similar in both groups and was independent of altitude. Ventilation was smaller and arterial carbon dioxide tension higher, at the steady state, among the Sherpas. The sensitivity of ventilation during exercise to alterations of oxygen tension of the inspired air, over a range of 75–150 mm. Hg. was less in the Sherpas than in the lowlanders. Heart rate increased with exercise to a greater degree among the Sherpas, as did VO_2. Inhalation of oxygen-rich gas mixtures decreased the slope of the heart rate-VO_2 curve in these subjects, while in the lowlanders, this slope was increased on oxygen inhalation. Oxygen saturation was similar in both groups, although blood pH was found to be lower in the Sherpas. The major conclusion drawn from these observations, that long-term and short-term altitude acclimatization have different physiological characteristics, was found to be compatible with the data obtained on a Sherpa subject who was studied at sea level.

A67-81882
EFFECT OF IMMERSION IN WATER ON VITAL CAPACITY AND RESIDUAL VOLUME OF THE LUNGS.
Albert B. Craig, Jr. and Donald E. Ware (Rochester U., School of Med. and Dentistry, Dept. of Physiol., N. Y.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 423–425. 10 refs.
Grant NHI HE 09676.

The vital capacity and residual volume of 21 healthy, adult males were measured with the subjects seated in air and then immersed upright to the level of the neck in water. The vital capacity was decreased from a mean values of 5.33 liters in air to 5.10 liters during immersion. The residual volume in air was 1.44 liters and in water was 1.38 liters. The change in the vital capacity was statistically significant while the change in residual volume was not. There was no difference in the results between one-half of the group studied in water 27°C. and the other half in water 35.5°C.

A67-81883
LIMITS TO ARTERIAL NITROGEN TENSION IN UNEVENLY VENTILATED AND PERFUSED HUMAN LUNGS.

F. Wiener, C. Hatzfeld, and W. A. Briscoe (Columbia U., Coll. of Physicians and Surgeons and Bellevue Hosp., New York City and Intern. Business Machines Corp., Adv. Systems Develop. Div., Yorktown Heights, N. Y.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 439–457. 22 refs.
Grants NHI HE 02001-09, NHI HE 05741, NIH 2F05-TW-830-01, and Contract HRC U-1067.

A model with three gas-exchanging compartments, consisting of slowly, intermediately, and rapidly ventilating spaces, each perfused by venous blood, is used to fit the measured data in patients with unevenly ventilated and perfused lungs. Three compartments are required to assure that the slow-space ventilation as well as alveolar and arterial oxygen and carbon dioxide tensions in the model be equal to those measured experimentally. All the possible distributions of ventilation and perfusion compatible with the given values for alveolar and arterial PCO_2 and PO_2 correspond to arterial nitrogens (Pa_{N_2}) lying within a narrow range. At the maximum Pa_{N_2}, the three-compartment distribution reduces to the two-compartment system described by Farhi by virtue of the slow-space's ventilation-perfusion ration being identical with either one of the other spaces. At the minimum Pa_{N_2}, the distribution is such that the fast space is, in effect, an alveolar dead space.

A67-81884
INFLUENCE OF MEDIASTINAL STRUCTURES ON THE ESOPHAGEAL PRESSURE GRADIENT IN DOGS.
D. Trop, K. P. Van de Woestijne, and M. Afschrift (U. Clin. St. Rafael, Dept. of Med., Leuven, Belgium).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 426–432. 22 refs.

The esophageal pressure gradient was studied in curarized dogs in different body positions. In the upright position, a mean gradient of 0.28 cm. H_2O/cm. is observed. The gradient completely disappears following thoracotomy and collapse of the lungs. Still, in the supine and prone positions, discontinuous pressure variations, already observed in the intact animals, persist after pulmonary collapse. In the various body positions, before as well as after thoracotomy, a positive correlation is observed between pressure in the esophagus and esophageal elastance. This points to an intervention of the mediastinum in the observed positional pressure variations. It is shown, indeed, that traction or pressure exerted by the mediastinal structure simultaneously modifies esophageal pressure and elastance. Therefore, the esophageal pressure gradient in the upright position seems to be the result primarily of those mediastinal effects. Only in the middle third of the esophagus are the observed positional pressure variations possibly a reflection of the pleural pressure gradient.

A67-81885
SATURATION AND DESATURATION WITH N_2 AND HE AT 4 ATM.
A. A. Bühlmann, P. Frei, and H. Keller (Zurich U., Dept. of Internal Med., Switzerland).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 458–462. 18 refs.

Forty-three subjects were exposed to 4 atm. (100 ft.) in 120 experiments of 3–72 hr. duration, by breathing air or a mixture of 80% He/20% O_2. Using a factor of critical oversaturation (surfacing ratio) of 1.6–1.0, the longest half-times for N_2 were 420–480 min., and for He, 160–180 min. No "bends" appeared after decompression times according to these half-times. A practically complete saturation (>99%) requires 64 hr. for N_2 and 24 hr. for He. The differences in the saturation speed for a constant blood flow in the slowest fatty tissue can be explained by the difference of the oil/water solubility ratio for N_2 and He. Since in the experiments bends appeared mainly in watery tissues, like muscles and joints, the difference in pressure equilibration for a given slow perfusion ratio seems to be determined by the molecular weight similar to a diffusion-limited system.

A67-81886
THRESHOLD LIMIT VALUES FOR 1966.
Threshold Limit Value Committee.
Occupational Health Review, vol. 18, no. 2–4, 1966, p. 15–23.

Threshold limits based on the best available information from industrial experience, from experimental, human and animal studies, and when possible, from a combination of the three were given for airborne contaminants. These included organic, inorganic and particulate substances.

A67-81887
THE HEART CIRCULATION SYSTEM DURING CUTANEOUS INDUCTION OF HIGH CONCENTRATION CARBON DIOXIDE [DAS HERZ-KREISLAUFSYSTEM BEI KUTANER EINWIRKUNG HOHER KOHLENDIOXIDKONZENTRATIONEN].
K. A. Rosenkranz, H. Kollmeier, R. Köhl, H. Humperdinck, E. Fritze, B. Feuer, and H. Baumann.
Arbeitsmedizin Sozialmedizin Arbeitshygiene, vol. 2, Jun. 1967, p. 229–232. 15 refs. In German.

Atmospheric CO_2 concentrations of 45 to 90% caused a decrease in pulse rate and an increase in blood pressure during percutaneous induction and during oxygen respiration at rest and during work on a bicycle ergometer; therefore, the effects on the heart-circulation system were vagotonic. At an exposure time of 40 to 45 min., these vagotonic effects on circulatory regulation were not too pronounced. The shape of the electrocardiographic curve was not affected. The effect of these high CO_2 concentrations on the reaction of skin perspiration in the case of the simultaneous effect of potassium powder was not observed. A local skin effect above and beyond a vascular complication and thermal effect was therefore not likely.

A67-81888
METABOLIC AND THERMAL RESPONSES OF MAN IN VARIOUS HE–O_2 AND AIR ENVIRONMENTS.
Richard W. Bowers and Edward L. Fox (Ohio State U., Dept. of Phys. Educ., Columbus).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 561–565. 17 refs.
NASA Grant NSG-295; Mershon Found. and Ohio State U. supported research.

Metabolic and thermal responses of resting man were studied for two hr. while breathing and/or immersed in a He–O_2 mixed (70–76% He, 21% O_2, 3–9% N_2) or air in a comfortable thermal environment (29.4°C. DB, 19.0°C. WB). The gaseous combinations were: (1) air breathing, air immersion; (2) He–O_2 breathing, air immersion; (3) air breathing, He–O_2 immersion; and (4) He–O_2 breathing, He–O_2 immersion. The immersion gases were contained in a vinyl isolator while the subjects breathed from a separate gas source through a mouthpiece equipped with two one-way valves. Changes in mean skin temperature ($T_{\bar{s}}$) and rectal temperature (T_r) were found only between the trials in which the subjects were immersed in air or He–O_2, and were independent of the gases breathed. These changes were lower $T_{\bar{s}}$ ($P<.01$) and T_r ($P<.001$) in the He–O_2-immersion trials implying that He promotes body cooling solely because of its relatively high thermal conductivity. Oxygen consumption was independent of the immersion gases

and those breathed as were heart rate, pumonary ventilation, and respiratory exchange ratio. These results indicate that in man in a comfortable thermal environment He neither induces metabolic alterations at the cellular level, nor does the accelerated heat loss stimulate heat production measurably in two hr. of exposure.

A67-81889
TELEMETERED CARDIAC RESPONSE TO SELECTED RUNNING EVENTS.
William D. McArdle, Guido F. Foglia, and Anthony V. Patti (N.Y. City U., Queens Coll., Dept. of Health and Phys. Educ., Flushing).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 566–570. 24 refs.

By means of radiotelemetry the cardiac response prior to, during, and in recovery from selected track events was determined in 18 male varsity trackmen and four untrained subjects. The track events studied were the 60-yd., 220-yd., 440-yd., 880-yd., 1-mile, and 2-mile runs. It was concluded that: (1) In trained runners the heart rate immediately preceding the start of the race was highest in the 60-yd. dash and successively lower in events of longer distance. This anticipatory increase in heart rate represented 74% of the total heart rate adjustment to exercise in the 60-yd. dash and 33% in the 2-mile run. (2) The heart rate increased rapidly during the initial stages of each race with the heart rate reaching approximately 180 beats within 28 sec. during the 1-mile and 2-mile runs and within 10 sec. in the 220-yd. run. Heart rate pattern during the race and in recovery was similar in the untrained group. (3) Significantly higher peak heart rates were elicited in events of longer distance. There were no significant differences in maximum heart rates of trained and untrained. (4) Recovery from the 60-yd. dash was significantly more rapid than from any of the longer distances. No significant differences were demonstrated in recovery pattern of the 220-yd., 440-yd., 880-yd., 1-mile, and 2-mile runs.

A67-81890
NEW RAT FEEDING JAR: USE IN STUDY OF RELATIONSHIPS OF FOOD INTAKE AND BODY WEIGHT.
Robert J. T. Joy, Charles P. Emma, and Jean Mayer (Harvard School of Public Health, Dept., of Nutr., Boston, Mass.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 589–590.
Grants NIAMD AM 02911 and NINDB NB 01941; Harvard School of Public Health supported research.

An inexpensive, easily constructed, spillproof rat feeding jar is described. Using this method, a prediction formula for food intake by rats at various weights was determined. It was found that fasted body weight best correlated with the mean food intake for the preceding seven days, and that the formula, log food intake = log a+b log fasted body weight most appropriately described the relationship.

A67-81891
CONTINUOUS RECORDING OF REGIONAL CHANGES IN BRAIN BLOOD FLOW BY A PROBE.
Nelson E. Leatherman and John W. Beam (Mich. U., Dept. of Physiol., Ann Arbor).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 585–588. 21 refs.
Grant NIH HE-01646.

The design, construction, and tests of a miniature thermoelectric temperature-compensated flow probe for monitoring regional changes in cerebral blood flow such as those said to underlie regional changes in cerebral O_2 previously observed in O_2 convulsions are described. The reliability of the instrument is demonstrated in *in vitro* tests. Continuous recordings made of regional blood flow changes in the thalamus induced by anesthesia (Na pentobarbital) and by the administration of CO_2 to the unrestrained, unanesthetized, and anesthetized rat are presented and pertinent details described.

A67-81892
EFFECT OF THE STATIC AND DYNAMIC LOAD ON SOME PHYSIOLOGICAL FUNCTIONS OF THE ORGANISM. III. METHOD OF QUANTITATIVE EVALUATION OF THE STATIC LOAD [VPLYV STATICKEHO A DYNAMICKEHO ZATAZENIA NA NIEKTORE FYZIOLOGICKE FUNKCIE ORGANIZMU. III. CAST. METODA NA KVANTITATIVNE HODNOTENIE STATICKEJ NAMAHY].
Imrich Borský and Miloslav Hubač.
Pracovní Lékarství, vol. 19, Jun. 1967, p. 201–206. In Czech.

The paper continued two reports already published in which the changes of some respiratory functions and pulse rate were described, as well as their relationship during the work load and during recovery. There were correlations and regressions between the pulse rate, oxygen consumption and consumption/min. The relationship between the pulse rate in the fifth min. of work and the oxygen consumption/min. was marked as index P/O_2. From these values the evaluation scheme was determined, being classified in five ranges according to the size of the P/O_2 index value. The size of the static load was estimated by these ranges. In order that the proposed method of the static load evaluation may practically be applied, it is necessary to determine the oxygen consumption during the five min. exercise and the oxygen debt as well as the pulse increase in the fifth min. of work. The P/O_2 index may be calculated from these values. The relative size of the static load, as well as the absolute value of the muscle exertion during work may be calculated by means of the evaluation scheme, where the values of oxygen consumption/min. are plotted on the abscissa, the values of the $P-O_2$ index on the ordinate.

A67-81893
RESPIRATORY ELASTANCES IN RELAXED AND PARALYZED STATES IN NORMAL AND ABNORMAL MEN.
Paul Van Lith, F. Neal Johnson, and John Turner Sharp (Veterans Admin. Hosp., Cardiopulmonary Lab. and Surg. Serv. (Anesthesiol.), Hines, Ill. and Ill. U., Coll. of Med., Dept. of Med., Chicago).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 475–486. 24 refs.
Grant NIH HE 08789.

Lung, thoracic, and total respiratory elastances were measured in both the voluntarily relaxed and anesthetized paralyzed states in 26 normal men and in 30 abnormal men with obstructive lung disease, ankylosing spondylitis, or severe obesity. Thoracic and total respiratory elastances were consistently greater (i.e., compliance was lower) in the conscious, voluntarily relaxed state than in the anesthetized, paralyzed state and elastances in the two states correlated poorly. Assuming thoracic and total respiratory elastances measured in the paralyzed state to be the true values, close reproducibility of elastance measurements made in the conscious relaxed state was not found to be a reliable criterion for their validity. We believe that the most reasonable explanation for higher thoracic and total respiratory elastances in the relaxed state is the presence of expiratory muscle activity at the resting midposition. This muscle activity is probably not under voluntary control and may be activated by muscle spindle reflexes. We conclude that thoracic and total respiratory elastances measured in the conscious relaxed state are of questionable validity, particularly in lightly trained subjects.

A67-81894
HYSTERESIS AND STRESS ADAPTATION IN THE HUMAN RESPIRATORY SYSTEM.
John Turner Sharp, F. Neal Johnson, Norma B. Goldberg, and Paul Van Lith (Veterans Admin. Hosp., Cardiopulmonary Lab., Hines, Ill. and Ill., U., Coll. of Med., Chicago).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 487–489. 24 refs.
Grant NIH HE 08789.

Respiratory system volume-pressure hysteresis and stress adaptation have been investigated in 28 normal subjects and ten patients with restrictive abnomalities of the thorax during general anesthesia and neuromuscular blockade. In normals both hysteresis and stress adaptation were greater in the lungs than in the thorax although present in both. The time course of stress adaptation was exponential and was slightly faster in the lungs than in the thorax. Stress adaptation increased with lung volume in non-linear fashion, being disproportionately greater at higher volumes. Some, but probably not all, of the characteristics of stress adaptation may be explained by a mechanical analog consisting of simple viscoelastic units arranged in series and parallel combinations. Stress adaptation probably resides in the properties of respiratory system tissue components: alveolar surfactant film, elastic tissue, and smooth muscle in the lung and elastic tissue and skeletal muscle in the thorax.

A67-81895
EFFECT OF AMBIENT TEMPERATURE AND VAPOR PRESSURE ON CILIA-MUCUS CLEARANCE RATE.
A. M. Baetjer (Johns Hopkins U., School of Hyg. and Public Health, Dept. of Environ. Med., Baltimore, Md.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 498–504. 13 refs.
Contract DA-49-193-MD-2055.

The clearance rate of $Na^{131}I$ droplets, injected low in the trachea, was measured in the upper trachea of intact anesthetized chicks by two detectors placed in series over the neck. Body temperature was held constant while the head was exposed to various test ambient temperatures (T_a) (40–95 F.) and vapor pressures (VP) (3–39 mm. Hg.) following two days pretest exposure to the same or different T_a and VP. The clearance rate ranged from 7.4 to 17.9 mm./min. varied directly with the test T_a and inversely with the pretest T_a and VP. Thus, it was fastest when chicks were moved from cold pretest to hot test T_a, and vice versa. The effect of test T_a on clearance was due to accompanying changes in intratracheal temperature. The effect of pretest T_a was was not due to changes in rectal or tracheal temperatures, metabolic rate, or water content of the mucosa. The respiratory rate recorded during the test was slowest after hot pretest exposures at all test T_a and fastest with cold pretest followed by hot test T_a. Water withdrawal for 72 hr. led to a decrease in both clearance and respiratory rates.

A67-81896
OXYGEN UPTAKE IN MAN DURING EXHAUSTIVE WORK AT SEA LEVEL AND HIGH ALTITUDE.
James E. Hansen, James A. Vogel, Gerald P. Stelter, and C. Frank Consolazio (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. and Bioenergetics Div., Denver, Colo.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 511–522. 46 refs.

Oxygen uptake (V_{O_2}) was measured in 16 healthy soldier volunteers at sea level and 4,300 m. (Pikes Peak) before, during, and after exercise on the bicycle ergometer. V_{O_2}'s at 4,300 m. were similar to sea-level values at rest and during mild and moderate exercise. Mean maximum V_{O_2} at 4,300 m. was 83% of sea-level value and was unaffected by rate of ascent. Resting and exercise ventilations increased at 4,300 m., first by a rise in breathing frequencies and later by an increase in tidal volumes. During increasing exercise at 4,300 m., the alveolar-arterial difference for oxygen increased more than at sea level and the oxygen saturation of arterial blood decreased. During maximum work the oxygen saturation of mixed venous blood did not decline to sea-level values. Total work until exhaustion did not improve after two wks. at 4,300 m. despite rises in maximum exercise ventilation and oxygen content of arterial blood. Physical training at 4,300 m. was of no greater value than similar training at sea level in increasing sea-level maximum V_{O_2}.

A67-81897
ARTERIAL PYRUVATE, LACTATE, PH, AND PCO_2 DURING WORK AT SEA LEVEL AND HIGH ALTITUDE.
James E. Hansen, Gerald P. Stelter, and James A. Vogel (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 523–530. 42 refs.

In 16 normal subjects on ascent to 4,300 m. from sea level, resting concentrations of CO_2, actual bicarbonate, and hydrogen ion in arterial blood fell significantly while pyruvate and lactate rose equivocally. Resting pyruvate and lactate decreased significantly with acclimatization. At both altitudes, hydrogen ion, pyruvate, and lactate rose significantly with each increase in exercise while partial pressure of CO_2 and actual bicarbonate declined significantly with moderate or maximum exercise. At each level of exercise, pyruvates were significantly higher soon after arrival at 4,300 m., and then lower than sea-level values after two weeks' acclimatization. Maximum work hydrogen ion increases were less at 4,300 m. but sufficient to drop the pH below 7.30.

A67-81898
CARDIOVASCULAR RESPONSES IN MAN DURING EXHAUSTIVE WORK AT SEA LEVEL AND HIGH ALTITUDE.
James A. Vogel, James E. Hansen, and Charles W. Harris (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 531–539. 37 refs.

Multiple cardiovascular measurements were made at sea level and 4,300 m. (Pikes Peak, Colorado) on 16 young male volunteers during rest, mild, moderate, and maximum bicycle ergometer exercise and recovery. Subjects were divided so that effects of rate of ascent and physical conditioning could be assessed. The cardiovascular response to hypoxemia during the first four days at 4,300 m. consisted of: (1) an increase over seal level in cardiac output at rest (12%), during all levels of exercise (16–18%), and after 10 min. of recovery (20%); (2) a slight elevation in arterial blood pressure; and (3) a fall in total peripheral resistance concomitant with the rise in cardiac output. The enhanced cardiac output was due primarily to an increased heart rate at rest and mild work but included a stroke volume response over that of sea level during moderate and maximum work. Maximum attainable heart rate was less at high altitude. All measurements returned to or near sea-level values by the third wk. at 4,300 m. except heart rate. Rate of ascent had a significant effect, particularly on stroke volume, while little effect was attributable to physical conditioning.

A67-81899
THE TIME COURSE OF PREPARATION.
Paul Bertelson (M.R.C., Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 272–279. 25 refs.
Belgian Fonds Natl. de la Rech. Sci. supported research.

The time course of the adjustments triggered by a warning signal was studied by measuring choice reaction times (RTs) at different predictable foreperiods after such a signal. Before the warning signal, a high time uncertainty situation was created by imposing either a long constant foreperiod of five sec. or one varying in the range 1.5 to five sec. The warning signal was a click. Foreperiods ranging from 0 to 300 millisec. were used in different blocks of trials. The stimulus was the onset of one of two lamps calling for the pressing of one of two keys. A control condition, without click was used also. RTs were found to decrease continuously when the foreperiod was increased from 0 to 100–150 millisec. The click delivered simultaneously with the stimulus permitted reactions significantly faster than in the control condition. It is concluded (a) that the latency of preparation can be much shorter than the 2 to 4 sec. reported; (b) that the warning signal can be used as a time cue to start preparatory adjustments without starting a refractory period of the order of magnitude found in experiments with pairs of successive reactions, and thus that such refractory periods are not the inevitable cost of paying attention to a signal. There is also some suggestion that in this situation the click not only triggers preparatory adjustments, but also causes an immediate facilitation of the reaction to the visual stimulus.

A67-81900
WORK CAPACITY IN CHRONIC EXPOSURES TO ALTITUDE.
D. B. Dill, Loren G. Myhre, Douglas K. Brown, Kay Burrus, and Gale Gehlsen (Nev. Southern U., Desert Res. Inst., Lab. of Environ. Patho-Physiol., Boulder City).
Journal of Applied Physiology, vol. 23, Oct. 1967, p. 555–560. 10 refs.
Grants PHS CD 00056 and NSF GB5217.

Three men aged 20, 29, and 75, and two women aged 29 were subjects in Balke tests on the von Döbeln bicycle ergometer four or five times during three weeks in desert heat, several times during three weeks at high altitudes, and during a second period in the desert. The observations paralleled those of 1965 in which the exposures to altitude were acute rather than chronic; the four men of that study included the three of this study. In chronic versus acute exposures four of the subjects could not attain as high values for oxygen consumption (VO_2), work rate, blood lactate, or heart rate at least during the first week at altitude. On the other hand, pulmonary ventilation increased more rapidly and reached higher levels. The decrement in performance during the first days at altitude may be twice as great as during the first hr. Recovery from this deterioration requires two or three wk. When values for VO_{2max} and maximum work rate (WR_{max}), were referred to the amount of lean body mass, the two women and one young man were in the same category. Another man, Myhre, reached the highest values for VO_{2max} and WR_{max} referred to lean body mass, and Dill was at the other extreme. Lean body mass varies not only in quantity but also in quality.

A67-81901
STUDIES ON BIOCHEMICAL AND RADIOPROTECTIVE EFFECTS OF THIOLS AND DISULPHIDES ON DNA AND NUCLEAR SH-PROTEINS.
Egil Jellum (Oslo U., Inst. of Clin. Biochem., Norway).
Oslo, Universitetsforlaget, [1967], [100] p. Many refs. $2.34.

A compilation of the author's reprints of eight papers concerning the radioprotective effect of thiols and disulfides is produced in this book. An introductory chapter reviews and summarizes these papers. The mechanism of protection by cystamine and its derivatives is discussed in relation to deoxyribonucleic acid (DNA) dependent synthesis of ribonucleic acid (RNA). The function of cystamine-nucleic acid interactions in protecting DNA from x-ray injury is analyzed, and the possibility of RNA-cystamine interaction affecting ribosomal function in protein synthesis is pointed out.

A67-81902
RADIOBIOLOGICAL FACTORS IN MANNED SPACE FLIGHT.
Edited by Wright H. Langham (Calif. U., Los Alamos Sci. Lab., N. Mex.). Washington D. C., Natl. Acad. of Sci., Natl. Res. Council, 1967, xvii+274 p. Many refs.

Pertinent information on radiobiology, with emphasis on human responses to the potential radiation risks accompanying manned space flights of up to two or three yr. duration was reported. Included were: (1) radiobiological factors in manned space flight; (2) space-radiation environment; (3) factors modifying radiation response; (4) radiation measurements required for manned space flight; (5) early effects of radiation in man; (6) late or delayed effects of radiation in man; (7) other factors relevant to radiobiological aspects of manned space flight; (8) selection of response criteria and their application to space-radiation risks; and (9) suggestions for additional research.

A67-81903
INTRODUCTION TO ENVIRONMENTAL PHYSIOLOGY.
G. Edgar Folk, Jr. (Iowa U., Dept. of Physiol., Iowa City).
Philadelphia, Lea and Febiger, 1966, 308 p. 497 refs. $12.00.

This text book is primarily concerned with the physiological reactions of mammals to their total environment, and is intended for the graduate level of study. Chapters include information on biological rhythms, temperature regulation, physiology of hot and cold environments, hibernation, low pressure from terrestrial altitude, high pressure from air and water and various appendices on ecological data. Some problems of spaceflight are dealt with separately. A bibliography of 497 references is given.

A67-81904
PHYSIOLOGY IN INDUSTRY.
Lucien Brouha (Montreal U., Canada).
Oxford, Pergamon Press, 1967, xii+164 p. Many refs.

Through plant surveys and laboratory experiments, physiology in industry was investigated and evaluations were made of industrial stresses. Included were: (1) aspects of muscular activity; (2) physiological reactions to work at moderate temperature; (3) effects of the physical environment; (4) evaluation of heat stress; (5) evaluation of chemical environment; (6) physiological requirements of jobs; (7) improvements for stress and fatigue reduction; and (8) selection, placement and supervision of workers. Many references are listed.

A67-81905
HEALTH PHYSICS: PRINCIPLES OF RADIATION PROTECTION.
D. J. Rees.
Cambridge, Mass., M.I.T. Press, 1967, x+242 p. Many refs. $12.95.

A treatise is presented on the principles and application of the physics of radiation protection. A great deal of numerical

data used in radiation protection applications are given. Chapters include information of the biological effects of ionizing radiation, radiation dosimetry, standards for radiation protection and radiation protection measurements.

A67-81906
DIZZINESS AND VERTIGO.
Edited by Martin Spector (Temple U., School of Med. and Hosp., Philadelphia, Pa.).
New York, Grune and Stratton, 1967, xi+299 p. $17.75

The present state of knowledge of dizziness or vertigo is surveyed and classified, including that from various fields, i.e., otolaryngology, neurosurgery, neurology, psychiatry, internal medicine, allergy, ophthalmology, physiatry, etc. Each aspect is covered by a specialist experienced in that particular field. Presentation is attempted of a systematic scheme for the proper recognition of the symptom, elucidation of salient points in the history, details of the special vestibular tests, and radiology. The significance of the various findings is assayed and their relative importance evaluated. A classification of the causes on a clinical and anatomical basis is also presented. Treatment, both medical and surgical, are reviewed. References following each chapter and a subject index are included.

A67-81907
HIGH-ALTITUDE DISEASES.
Carlos Monge M. (U. Nacl. Mayor de San Marcos, Lima, Peru) and Carlos Monge C. (U. Peruana "Cayetano Heredia", Inst. de Invest. de Altura, Lima, Peru).
Springfield, Ill., Charles C. Thomas Publisher, 1966, ix+97 p. $5.75.

Various aspects on studies of the problem of life in high altitude are described and discussed. The following are included: (1) high-altitude environment; (2) the high-altitude native (physical anthropology and chemical and functional anthropology); (3) adaptation, acclimatization, and loss of acclimatization; (4) high-altitude diseases, including diagnostic measures and means of management; (5) anesthesia and surgery at high altitude; (6) high-altitude animal pathology (including animal infertility at high altitude and Brisket disease—chronic mountain sickness of cattle); and (7) historical confirmations (physical culture, interior colonization, adaptive diseases, adaptive diseases to Highlands, and racial adaptation). Conclusions, a bibliography, and a subject index are included.

A67-81908
STUDIES OF DISTRIBUTED PRACTICE: XXIV. DIFFERENTIATION AND PROACTIVE INHIBITION.
Benton J. Underwood and Bruce R. Ekstrand (Northwestern U., Evanston, Ill.).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 575–580. 6 refs.
Contract Nonr-1228(15).

This study was concerned with the fact that for the A–B, A–C paradigm, widely distributed practice (DP) on A–B will markedly reduce proactive inhibition (PI). It was assumed that this was due to increased differentiation between the two lists. To decrease differentiation while still maintaining DP, in some conditions pairs occurring in A–B were repeated in A–C. These operations were also carried out with the A–B, C–D paradigm, and a control was used to assess amount of PI. DP was again shown to decrease PI for the A–C paradigm in 24-hr. recall; statistically, the level of recall was equivalent to the control. No influence of DP was observed for the C–D paradigm. Repeated pairs increased PI for the nonrepeated pairs in A–C, having no influence on C–D.

A67-81909
PERIMETRIC STUDY OF FIELD DEFECTS IN MONKEYS AFTER CORTICAL AND RETINAL ABLATIONS.
Alan Cowey (Cambridge U., Psychol. Lab., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 232–245. 8 refs.
Grants PHS NB-04800-02 and MRC G.965/96/B.

Monocular visual field defects were studied in two monkeys. In one, the macular retina was destroyed by photocoagulation, producing a central scotoma and consistent 5° eccentric fixation. In a second animal the effects of removal of macular projection area in striate cortex and subsequent photocoagulation of the macula were compared. The cortical operation produced a partial field defect, i.e. a region of diminished sensitivity but not a scotoma, which became with practice much smaller than the region of retina whose primary projection area had been ablated. A 10° eccentric fixation was observed. Following the second, retinal, operation a macular scotoma was demonstrated whose size and position corresponded closely with the area of retinal destruction as determined by photography of the fundus and later histological examination of the retina.

A67-81910
ORDER OF PRESENTATION, CS INTENSITY, AND RESPONSE LATENCY.
G. Robert Grice, John J. Hunter, David L. Kohfeld, and Laraine Masters (Ill. U., Urbana).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 581–585. 8 refs.
Grant NIMH MH 08033.

Five orders of presentation of 50- and 100-db. auditory CSs were used in a study of eyelid conditioning. The orders were random, single alternation, double alternation, and alternate blocks of five and ten. A second single alternation group was informed of the order in advance. Regularity, instructions concerning regularity, and block length, all failed to affect the size of the intensity effect. Latency distributions are also presented. Responses to the loud tone reach their peak frequency earlier in the interval than do those to the soft. The possibility that latency mechanisms account for intensity effects in conditioning is suggested.

A67-81911
CODING PROCESSES IN VERBAL LEARNING AS A FUNCTION OF RESPONSE PRONOUNCEABILITY.
William E. Forrester and Norman E. Spear (Rutgers U., New Brunswick, N. J.).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 586–588. 5 refs.
Grant NIMH MH10194 and Rutgers U. supported research.

The effect of rated trigram pronounceability (PR) on the extent to which subjects will use anagram coding in learning a list for free recall was investigated. Variables were coding instructions, letter-sequence restrictions on recall, and PR. All variables affected the extent and effectiveness of encoding to words. The operant level of anagram coding showed a significant inverse relationship with PR. The suggestion was made that pronunciation itself is a type of code, used, whenever applicable.

A67-81912
REVERSAL OF THE MULLER-LYER ILLUSION WITH CHANGES IN THE LENGTH OF THE INTER-FINS LINE.
Brian J. Fellows (Portsmouth Coll. of Technol., Dept. of Liberal Studies, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 208–214.

Subjects were asked to judge the relative lengths of lines placed between the ingoing and the outgoing fins of a Müller–Lyer figure. It was found that with the gap between the fins constant at 160 mm. there was a reversal of the normal Müller–Lyer illusion when the inter-fins line was between 40 and 100 mm. long. This effect was maximal when the line was 80 mm. The normal illusion returned when the line was increased in length to 120 mm. These findings do not support Gregory's inappropriate constancy scaling theory. They seem to suggest the operation of two distinct illusory forces in the Müller–Lyer situation. The reverse illusion may be due to the greater expansion effect upon the line between the ingoing fins, caused by the greater "enclosing" nature of these fins.

A67-81913
INTERMANUAL TRANSFER OF PRACTICE DECREMENTS WITH A HAPTIC ILLUSION.
R. Over (Otago U., Psychol. Dept., Dunedin, New Zealand).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 215–218. 8 refs.
New Zealand U. Grants Comm. supported research.

Sixteen subjects were given eight pre-practice, 80 practice, and eight post-practice trials with the inverted T illusion figure. Judgments were made haptically with one hand being used on pre- and post-practice trials and the other hand on practice trials. Mean illusion diminished in magnitude over the practice trials. Inter-manual transfer of the practice decrement was found, but it was partial rather than complete. The illusion after practice was less than before practice, but it was greater than the error found on the last block of practice trials. The bearing of these results on the different theories of illusions is considered.

A67-81914
CONTRAST AND CONFLUXION AS COMPONENTS IN GEOMETRIC ILLUSIONS.
Veijo Virsu (Helsinki U., Inst. of Psychol., Finland).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 198–207. 15 refs.
Board of Natl. Res. Councils supported research.

Two experiments on illusions were planned to test the predictive power of explanations based on size contrast and confluxion. The predictions turned out to be correct. A modification of the Müller–Lyer figure and an illusion of divided distance were used as stimulus figures. In the latter the dividing distances were underestimated. It proved to be methodologically necessary to measure contrast effects as differences between results of two experimental procedures, because small intervals as such were overestimated. It was not possible to explain all the results by means of the constancy theory in the form suggested by Gregory. Neither contrast nor constancy alone is sufficient to explain the geometric illusions. The development of an adequate theory by combining these two explanations seems possible.

A67-81915
BINOCULAR RIVALRY AND IMMEDIATE MEMORY.
H. Sampson and J. B. Horrocks (Auckland U., Dept. of Psychol., New Zealand).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 224–231. 17 refs.
U. Grants Comm. supported research.

Three experiments examine features of a simple memory task on which right-handed, right eye dominant subjects have been reported to recall digits projected to the right eye more accurately than those projected simultaneously to the left eye. Superior recall by these subjects of information projected to the right eye was observed only when stimuli projected simultaneously to both eyes were seen as overlapped in the binocular percept. Under monocular presentations, accuracy of recall was not related to the eye with which stimuli were viewed. The binocular overlap condition has a significance other than that of simply increasing the difficulty of identifying the elements in a visual display for there were no differences in accuracy of recall from each eye when overlapped stimuli were viewed monocularly. More accurate recall of right eye information appears to reflect the resolution of a conflict between inputs from each eye. The possible relation of this finding to cerebral dominance is also discussed. Order of recall in these experiments depended mainly on spatial cues provided by the experimental situation.

A67-81916
A COMPARISON OF THE EFFECTS OF INFEROTEMPORAL AND STRIATE CORTEX LESIONS ON THE VISUAL BEHAVIOUR OF RHESUS MONKEYS.
Alan Cowey and Lawrence Weiskrantz (Cambridge U., Psychol. Lab., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 19, Aug. 1967, p. 246–253. 24 refs.
Grant PHS NB-04800-02 and MRC G.965/96/b.

The effects of bilateral removal of inferotemporal cortex or lateral striate cortex are compared. The former operation impairs visual pattern discrimination learning, without disturbing prompt detection and retrieval of food, visual acuity or visual fields. In contrast, animals in which the mascular striate projection area has been removed are significantly superior in tests of visual pattern discrimination learning despite showing impairment of visually guided reaching, visual acuity, and visual fields. The results indicate that the inferotemporal defect is not caused by deficient visual sensitivity or acuity.

A67-81917
RADIO-TELEMETRIC INVESTIGATION OF THE HEART FREQUENCY AT ROWING UNDER TRAINING LOAD [RADIO-TELEMETRISCHE UNTERSUCHUNGEN DER HERZFREQUENZ BEIM RUDERN UNTER TRAINGSBELASTUNGEN].
Leon Bassan.
Theorie und Praxis der Körperkultur, vol. 16, Apr. 1967, p. 343–358. 13 refs. In German.

Heart frequency was measured in ten oarsmen using a radio telemetric method. Definite variations were found at all phases, and the results were statistically analyzed. The heart frequency fluctuated around 72 ± 8.1 beats/min. at rest. During warm up on land and in the water, the heart frequency rose to 150 beats/min. During rowing the frequency was 160 ± 12.0 beats/min. and decreased rapidly to 129 ± 13.9 beats/min. after stopping. The heart frequency was thought to be an insufficient index of work load.

A67-81918
CENTRE OF GRAVITY MOVEMENT IN THE STANDING HUMAN BODY.
P. G. Morgan (Sydney U., Dept. of Mech. Eng., Australia) and R. Watkins (New South Wales U., School of Mech. Eng., Kensington, Australia).
Nature, vol. 215, Jul. 15, 1967, p. 324–325.

Preliminary measurements were made of the continuous movement of the center of gravity of the human body using a horizontal circular platform supported by cantilevers fitted with strain gauges. It was found that subjects tended to be biased towards

one foot and the movement of the center of gravity tended to follow a line parallel to the axis of the biased foot. It was proposed that equipment be developed to investigate the effect of posture and stance on stability and to provide quantitative data for the analysis of the balance mechanism of the body.

A67-81919
INFLUENCE OF INSTRUCTIONS ON DEGREE OF SHAPE CONSTANCY.
William H. Lichte (Mo. U., Columbia) and C. Robert Borresen (Wichita State U., Kan.).
(Midwestern Psychol. Assn., Meeting, St. Louis, 1960).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 538–542. 7 refs.
Contract AF 33(600)31315.

Subjects were instructed to respond either to "real" shape (object instructions), how the stimulus looked (apparent instructions), or the stimulus silhouette (image instructions) of complex figures. Three groups of 15 subjects were used, each with only one kind of instruction. The four standard stimuli were complex and unfamiliar. The subject manipulated the shape of the variable stimulus to equal that of the turned standard stimuli. Obtained Brunswik ratios (BR) for the Object, Apparent, and Image groups were .90, .62, and .45; the first differed significantly from the others. Distributions of individuals' mean BR for Object and Image groups did not overlap; that of the Apparent group was U shaped and overlapped the others. Results suggested that, in a "normal" situation; (a) object instructions produce nearly "perfect" constancy, (b) the image instruction cannot eliminate constancy, and (c) the conventional apparent instruction is ambiguous, resulting in either an object or image set.

A67-81920
CHOICE REACTION TIME AS A FUNCTION OF STIMULUS UNCERTAINTY, RESPONSE UNCERTAINTY, AND BEHAVIORAL HYPOTHESES.
Ira H. Bernstein, Donald L. Schurman, and Gene Forester (Tex. U., Arlington State Coll., Austin).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 517–524. 12 refs.
Grant NIMH MH-11173-01.

Two studies were concerned with the effects of stimulus and response uncertainty upon reaction time (RT). In Experiment I, it was found that changes in stimulus uncertainty produced linear changes in RT but changes in response uncertainty produced a step function with a maximum at one bit of response uncertainty. Correct pretrial guesses as to which stimulus event would occur tended to facilitate RT only in the more complex response-uncertainty conditions. Experiment II replicated the finding that stimulus uncertainty per se is a variable effecting RT. The results were discussed relative to the role of attention and response conflict.

A67-81921
INCREASED RESISTANCE OF MICE TO X-IRRADIATION AFTER THE INJECTION OF BEE VENOM.
William H. Shipman and Leonard J. Cole (U.S. Naval Radiol. Defence Lab., San Francisco, Calif.).
Nature, vol. 215, Jul. 15, 1967, p. 311–312. 13 refs.

Male mice were subjected to x-ray irradiation after being treated with bee venom. It was found that the venom provided protection when it was administered 24 hr. before exposure. Preliminary chemical fractionation studies were carried out in an attempt to identify the radioprotective constituent(s) of bee venom. Three mechanisms were reported which may account for the radioprotective effect of bee venom, and those mechanisms will be investigated further as well as experiments to separate, purify and identify the biologically active constituents of bee venom.

A67-81922
CUE UTILIZATION IN SERIAL LEARNING.
Sam C. Brown and Eugene D. Rubin (Kan. State U., Manhattan).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 550–555. 14 refs.
Grants NIMH MH 10019 and NIMH MH 11179.

Four groups of 30 subjects each learned either a 12-item serial list of low-meaningful (Lo–M) or high-meaningful (Hi–M) trigrams, with or without differently colored backgrounds surrounding each of the trigrams. After serial learning (SL), the list was broken into successive pairs for paired-associate (PA) learning; the odd-numbered items (trigrams, colors, or both) becoming stimuli and the even-numbered trigrams their responses. The results showed relatively faster PA learning for color than trigram stimuli in middle serial positions under the Lo–M list, but not under the Hi–M list. Under no conditions did color facilitate SL. The results were interpreted as indicating stronger color-trigram associations in middle positions and/or more interference from color in end positions. Relevance of the results for sequential and positional associations in SL is also discussed.

A67-81923
EFFECTS OF INDUCED CHUNKING ON TEMPORAL ASPECTS OF SERIAL RECITATION.
R. S. McLean and L. W. Gregg (Carnegie Inst. of Technol., Pittsburgh, Pa).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 455–459.
Grants PHS MH-07722 and PHS 1-F1-MH-29, 112-01.

Seventy-five subjects learned serial lists composed of random orders of 24 letters of the English alphabet. The main independent variable was stimulus grouping, where the letters were presented either one, three, four, six, or eight letters at a time. After reaching the criterion of one perfect recitation, subjects were required to recite the serial list backward. Time intervals between the letters during the criterion and backward recitations were analyzed to show the induced chunking produced by the stimulus grouping.

A67-81924
STRESS EFFECTS ON SKILL.
M. Paul Willis (Mont. State U., Missoula).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 460–465.
Grant NIMH MH-04215-02.

During 60 one-hr. acquisition trials on a rifle-marksmanship task, 20 subjects encountered low stress (2 ft. lb. of recoil) while another 20 subjects encountered high stress (25 ft. lb.). Subsequently, all subjects received 24 transfer trials, one-half of each group operating under unchanged stress levels and one-half under reversed stress levels. The results suggest that stress affects transfer performance in three distinguishable ways: (a) through stimulus generalization, (b) through acquisition skill level, and (c) directly, i.e., independently of stimulus generalization and acquisition skill level.

A67-81925
SOME TEMPORAL CHARACTERISTICS OF VISUAL PATTERN PERCEPTION.

Charles W. Eriksen and James F. Collins (Ill. U., Urbana).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 476–484. 16 refs.
Grants PHS MH-1206 and PHS K6-MH-22,014.

Visual stimuli were constructed so that any given stimulus by itself appeared to be a random collection of dots. However, when two corresponding stimuli were superimposed by means of a two-field tachistoscope, a three-letter nonsense syllable was perceived. Temporal organization in perception was studied in Experiment I by varying the interval between the presentation of the two corresponding patterns over 300 msec. Identification accuracy of syllables was a decreasing function of interstimulus interval over a range in excess of 100 msec. Experiment II used unequal energy levels for the two corresponding patterns and also varied the sequence of occurrence of the high and low energy members of corresponding sets. The relevance of such concepts as perceptual memory, afterimages, and psychological moments to the data was considered. It was suggested that mechanisms in the visual system such as the "off" response that detect the termination of a stimulus may be responsible for inhibition of integration over time.

A67-81926
ASYMMETRIC-REINFORCING EVENTS IN PROBABILITY LEARNING.
Harry L. Madison and Patrick A. Boudewyns (Wis. U., Milwaukee). *(Midwestern Psychol. Assn., Meeting, Chicago, 1962).*
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 492–499. 8 refs. Wis. U. supported research.

Predicting occurrence of one of two reinforcing lights (symmetric situation) was compared with predicting occurrence and nonoccurrence of one light (asymmetric situation) in two experiments. The situations differed significantly, with subjects showing preference for predicting occurrence over nonoccurrence. Three statistical-learning hypotheses were evaluated. A modified model, assuming occurrence to be more reinforcing (more elements conditioned per trial) than nonoccurrence, best described the differences.

A67-81927
RELATION BETWEEN STIMULUS RECOGNITION AND PAIRED-ASSOCIATE LEARNING.
Edwin Martin (Mich. U., Ann Arbor).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 500–505.
Contract AF 49(638)-1235.

The hypotheses tested were that association activation, as evidenced by correct responding, is contingent upon stimulus recognition but that stimulus recognition does not depend upon the existence of associated responses. The data support both hypotheses. Using the study-test method, subjects were given practice on 12 trigram-number pairs where six of the pairs remained intact and six were re-paired on each study trial. On each test trial, the 12 study-trials trigrams were randomly intermixed with 12 new filler trigrams. The subject had first to make a stimulus-recognition response and then to emit a number response.

A67-81928
INCUBATION OF ANXIETY: EFFECT ON GENERALIZATION GRADIENTS.
Otello Desiderato and Merton E. Wassarman (Conn. Coll., New London).
Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 506–510. 13 refs.

The subjects were trained to label a visual stimulus and then were tested—either immediately or after a delay—for generalization of the verbal response. One-half of the subjects within each delay group received initial training under aversive, the other one-half under nonaversive, conditions. Each sub-group was further subdivided into high and low anxious subjects. Gradients of higher elevation were produced by aversive training and by anxious subjects. If anxious subjects were tested after a delay, generalized responses increased; if nonanxious subjects were delayed before testing, generalized responses declined. No effects on gradient slopes were found. Considered together with self-rating data, the results seemed to support an "incubation" of anxiety interpretation, provided certain assumptions were made regarding anxiety-arousal conditions among anxious subjects.

A67-81929
DIURNAL VARIATIONS OF FIBRINOLYTIC ACTIVITY AND PLASMA-11-HYDROXYCORTICOSTEROID LEVELS.
I. Sudhakaran Menon, P. A. Smith, R. W. B. White, and H. A. Dewar (Newcastle upon Tyne U. and Roy. Victoria Infirmary, Depts. of Med. and Biochem., Great Britain).
Lancet, vol. 2, Sep. 9, 1967, p. 531–532.

Plasma-hydrocortisone and euglobulinlysis times were estimated, simultaneously, at 9 A.M. and 4 P.M. in eleven ambulant men and five bedridden patients. In both groups, plasma-hydrocortisone was lower and fibrinolytic activity significantly higher in the afternoon than in the morning. The percentage change in the fibrinolytic activity was greater in the ambulant group than in the bedridden patients. The changes in plasma-hydrocortisone and fibrinolytic activity did not seem to be causally related.

A67-81930
COGNITIVE FACTORS IN THE RECOGNITION OF AMBIGUOUS AUDITORY AND VISUAL STIMULI.
John R. Frederiksen (Princeton U., N.J.).
Journal of Personality and Social Psychology, vol. 7, Sep. 1967, p. 1–17. 26 refs.
Contract Nonr 1858-(15), Grants NSF GB 3402, NSF GP579, PHS 1 P01 HDO1762-01[G and D] HDP, and NIGMS 5T01-GM-01001.

Subjects were asked to identify ambiguous auditory and visual stimuli (words and pictures), each of which was presented for a series of consecutive trials. On successive trials, the degree of ambiguity (auditory masking or amount of blur) was reduced, so that on the final presentation, the stimulus was easily recognizable. The subjects were divided into two groups; the WRA (wide range of ambiguity) group was given a series of 15 trials on each stimulus, while the NRA (narrow range of ambiguity) group was given fewer trials, starting at a lesser degree of ambiguity. It was found that the NRA group recognized the ambiguous stimuli earlier than did the WRA group, indicating that an initial misinterpretation of an ambiguous stimulus can interfere with its later veridical recognition. Performance on the recognition tasks was predictable from scores on a set of cognitive factors, among them flexibility of closure (field dependence–independence) and cognitive flexibility–rigidity.

A67-81931
HEATING PRODUCED BY ULTRASOUND IN BONE AND SOFT TISSUE.
Justus F. Lehmann, Barbara J. DeLateur, C. Gerald Warren, and Jerry S. Stonebridge (Wash. U., School of Med., Dept. of Phys. Med. and Rehabil., Seattle).
(Am. Congr. of Phys. Med. and Rehabil., 44th Ann. Session, San Francisco, Aug. 31, 1966).
Archives of Physical Medicine and Rehabilitation, vol. 48, Aug. 1967, p. 397–401. 7 refs.
Grant VRA RT-3.

The temperature distributions throughout the bone and soft tissues of hog thighs were measured before and after application of ultrasound. It was found that a selective rise of temperature occurred in front of the bone and in the cancellous bone. The resultant temperatures were highest in the cancellous bone, and were, on the average, one C.° higher than those in front of the bone. For therapeutic application in the human being, these findings imply that the temperature of the tissues in front of the bone, where such structures as synovium and joint capsule are located, can be increased to therapeutic but not to tolerance levels, since the temperature in the cancellous bone will reach tolerance levels first. These experiments raise the question whether or not a different temperature distribution, with peak temperatures within the joint structures, would be obtained at the level of the joint space. The temperature differences between the dead and live pig were attributed to blood flow changes, the cooling effect of which was greatest in and around the bone. This contrasts with the microwave studies, in which this cooling effect was greatest in the skin and subcutaneous tissues.

A67-81932
TEMPERATURE REGULATION AT HIGH ALTITUDE: QUECHUA INDIANS AND U.S. WHITES DURING TOTAL BODY COLD EXPOSURE.
P. T. Baker, E. R. Buskirk, J. Kollias, and R. B. Mazess (Pa. State U., Human Performance Res. Lab. and Dept. of Sociol. and Anthropol., University Park).
Human Biology, vol. 39, May 1967, p. 155–169. 10 refs.
Contract DA-49-193-MD-2260.

Young adult males at high altitude (4,050 m.) were exposed to total body cold while resting supine in the nude. There were two 120-min. exposures at 10°C. and one at 15°C. The Quechua Indian highland natives, in comparison to partially acclimatized U.S. Whites, showed higher mean-weighted skin temperatures, and in particular, higher digital temperatures, before and during exposure. Rectal temperatures were also higher in the Quechua, but this difference might be abolished with repeat exposures or longer exposure periods. Total oxygen consumptions were similar in the two groups during the first hr. of exposure, but in the final hr. the Whites showed a greater metabolic increase than the Indians. However, relative to surface areas, the smaller Indians had the greater oxygen consumption during the initial hr., while the two groups were similar in the final hr. The Indians therefore showed higher heat production, and also higher heat loss, particularly from the extremities, in comparison to Whites.

A67-81933
THE EXAMINATION OF THE VESTIBULAR ORGAN.
L. B. W. Jongkees (Wilhelmina Hosp., Otorhinolaryngol. Dept., Amsterdam, The Netherlands).
IN: SENSORY MECHANISMS: PROGRESS IN BRAIN RESEARCH, VOL. 3.
Edited by Y. Zotterman.
Amsterdam, Elsevier Publishing Co., 1967, p. 155–168. 10 refs. $14.50.

A description is given of the various methods for examining vestibular function. Many can be easily performed by any doctor at home such as the examination of walking, standing, pointing and spontaneous nystagmus. Others need more or less complicated apparatus; caloric, rotatory and galvanic tests, parallel and torsion swings, electronystagmography, etc. Many of these more complicated tests not only give information about the pathological reactions of the labyrinth, but they can also be used for research on normal function of this sense organ and its parts; of the otoliths, and into the pharmacological effect of drugs on vestibular reactions. Examples are given.

A67-81934
SENSORY INHIBITION.
Georg von Békésy (Hawaii U., Lab. of Sensory Sci., Honolulu).
Princeton, N. J., Princeton U. Press, 1967, x+265 p. 209 refs. $8.50.

Sensory inhibition was investigated over a period of years. A general similarity of inhibitory processes in the different sense organs was observed. Included were: (1) adaptation and inhibition as a means of suppressing an excess of information; (2) inhibition of simultaneous stimuli; (3) inhibition as a result of time delay; (4) stimulus localization as a method of investigating neural activity; (5) funneling and inhibition in hearing; and (6) role of inhibition in various fields of sensory perception.

A67-81935
PHYSIOLOGY OF EXERCISE.
Laurence E. Morehouse (Calif. U., Los Angeles) and Augustus T. Miller, Jr. (N.C. U., Med. School, Chapel Hill).
Saint Louis, C. V. Mosby Co., 1967, viii+322 p. $6.50.

In this latest edition basic physiologic information necessary for an understanding of the applied aspects of exercise physiology was provided. Included in the review were: (1) the nature of neuromuscular activity; (2) circulatory and respiratory adjustments during exercise; (3) metabolic and environmental aspects of exercise; (4) fatigue and training; and (5) the relationship of fitness and health to physical exercise.

A67-81936
HUMAN PERFORMANCE AND BEHAVIOUR IN HYPERBARIC ENVIRONMENTS.
John Adolfson (Göteborg U.; Karolinska Inst. Fac. of Med., Stockholm; and Roy. Swed. Navy, Stockholm, Sweden).
Stockholm, Almqvist and Wiksell, 1967, 74 p. 97 refs.

This book deals with studies of human performance and behavior in dry and wet hyperbaric environments, including ambient pressures of 13 ata. Trained divers and navy personnel were tested in a compression chamber. Manual dexterity and arithmetic calculation capacity were measured at rest and during exercise while subjects breathed air or a mixture of 20% O_2–80% He at normal and elevated pressures. Hearing discrimination tests and behavioral observations were made. Dexterity tests in air showed a decrease in performance with increasing pressure, while auditory perception deteriorated at depths of 60 m. or more. When breathing the helium mixture during rest and exercise at 1 ata and 10 ata, manual dexterity showed only a slight decrease at rest but not during exercise. Arithmetic calculation under these conditions showed no decrement. The fact that helium is less dense than nitrogen probably results in a decreased elevation of CO_2 tension in the tissues during exercise.

A67-81937
RADIATION CHEMICAL STUDIES OF P-AMINOBENZOIC ACID DERIVATIVES RADICAL SCAVENGERS AND RADIOPROTECTION.
Karl Ford Nakken (Norweg. Radium Hosp., Norsk Hydro's Inst. for Cancer Res., Oslo, Norway).
Oslo, Universitetsforlaget, 1966, [129] p. Many refs.

This book summarizes, analyzes and reprints previously published data on aspects of radioprotection. Specifically, the series of investigations is concerned with the ability of aromatic compounds to scavenge radicals induced in water by ionizing radiation and to study the mode of action of these radicals. The hydroxyl radical is of great importance and its interaction with

para-amino benzoic acid and its derivatives used as scavengers is investigated. It is concluded that these scavengers have a protective affect in their repairing of target molecules or by inactivating peroxy radicals in the vicinity. Many references are given.

A67-81938
IMMEDIATE RECALL AS A FUNCTION OF GRAMMATICAL STRUCTURE AND MODE OF PRESENTATION.
Joseph A. Bryk and Daniel C. O'Connel (St. Louis U., Mo.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 437–438. 8 refs.
Ford Found. Fac. supported research.

Immediate written recall of nonsense strings was studied in a three by two factorial design: structure (none, morphology, morphology and syntax) and mode of presentation (vertical and horizontal). Each subject recalled a string to criterion of two errorless trials in at least ten trials. Measures of recall indicated facilitation by structure in both modes of presentation. Multiple comparisons revealed no differences between the two levels of structure. Serial position of first written response differentiated modes of presentation in the nonstructured condition.

A67-81939
TWO KINDS OF SHORT-TERM STORAGE.
Herman Buschke (Stanford U., Div. of Neurol., Calif.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 419–420.
Grants NIMH MH-08556 and NIMH K3-MH-23,796.

The hypothesis that same-order and natural serial-order recall of numbers use a common short-term storage was tested by requiring either same-order or serial-order recall on two successive presentations of the same sequence. The results show the use of two different short-term storages, retaining information which refers to appropriate responses in long-term storage.

A67-81940
IMMEDIATE MEMORY FOR VISUAL PATTERNS: SYMMETRY AND AMOUNT OF INFORMATION.
M. M. Schnore (Western Ontario U. and Ontario Hosp., St. Thomas, Canada), and J. T. Partington (Alcoholism and Drug Addiction Res. Found., London, Ontario, Canada).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 421–422.
Grant OMHF 57.

Immediate recall for visual patterns which varied in degree of symmetry and amount of information was studied. It was found that recall errors were primarily a linear function of degree of symmetry and amount of information.

A67-81941
SUCCESSIVE TESTS OF SHORT-TERM RETENTION.
Lloyd R. Peterson and Linda H. James (Ind. U., Bloomington).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 423–424. 8 refs.
Grant NSF GB 3977.

Retention of individual trigrams was studied for six successive tests with counterbalancing of the retention interval of the previous test. Recall after an 18-sec. retention interval was found to become progressively worse in line with findings by Keppel and Underwood. Intrusions during the sixth test were found to display a recency effect.

A67-81942
PUNCTATE SENSITIVITY OF NORMAL AND FROSTBITTEN SKIN.
F. B. Colavita, S. Bingaman, D. Devos, and R. Tkak (Pittsburgh U., Pa.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 401–402. 6 refs.

Two equal areas of normal and frostbitten human skin were compared for their punctate sensitivity to warmth, cold, touch, and pressure. The frostbitten tissue was characterized by a decreased sensitivity to the cold stimulus and by a tendency for warmth and touch stimuli to elicit reports of pain from the subject. There appeared to be no differences in pressure sensitivity between the normal and damaged tissue. Some implications of the data for somesthetic sensitivity in general are mentioned.

A67-81943
STIMULUS PRESENTATION RATE AND LEVEL OF INTELLECTUAL COMPETENCY.
Musetta C. Gordon, Alan Gordon, and Celia Perrier (VA Hosp. and Woodward State Hosp.-School, Des Moines, Iowa).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 403–404. 6 refs.

The ability of retarded and normal adult subjects to follow instructions presented auditorially at three rates of speed was examined. Faster rates of stimulus presentation adversely affected the performance level of both groups in recalling and pointing to sequentially ordered concepts of size, color and form. The group of retarded subjects listening to instructions presented at the fastest rate had a significantly lower level of performance than the retarded subjects hearing instructions presented at the slowest rate.

A67-81944
EFFECTS OF TRAINING LEVEL ON REVERSAL AND EXTRADIMENSIONAL SHIFTS.
George R. Potts and B. R. Hergenhahn (Hamline U., St. Paul, Minn.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 409–410. 7 refs.

Reversal (RS) and extradimensional (EDS) shift groups were subdivided into undertrained (UT), criterion trained (CT), and overtrained (OT) conditions. Results indicated: (1) the RS was learned faster than the EDS in both the CT and OT conditions, but subjects in the UT conditions did not differ. (2) Subjects in the UT condition took longer to learn the RS than subjects in either the CT or OT conditions, but no significant difference was found between the CT vs. OT conditions. (3) The EDS group did not differ significantly with training level. The ORE was demonstrated, but the hypothesis that this ORE might be explained in terms of the increased awareness of incidental cues which has been found in OT was not supported.

A67-81945
THE EFFECTS OF ELECTRIC SHOCK ISOLATION IN SERIAL LEARNING.
David C. Raskin, Maureen Hattle, and Edwin W. Rubel (Mich. State U., East Lansing).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 413–414. 15 refs.

Mild electric shock was used to isolate the seventh syllable in a twelve-item serial list of nonsense syllables. The shock isolation produced the usual von Restorff effect. In addition, the isolation produced a spread of effect to adjacent items and facilitated the learning of the entire list. The results were interpreted in terms of enhanced orienting reflexes produced by the shock.

A67-81946
INTRADIMENSIONAL TRANSFER OF DISCRIMINATION ALONG THE HUE CONTINUUM.

George Marsh (Lehigh U., Bethlehem, Pa.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 411–412. 5 refs.

This experiment investigated the intradimensional explanation for the facilitation of performance on a difficult discrimination produced by prior training on an easy problem. Significant facilitation was found only in groups given prior intradimensional training and not in groups given prior extradimensional training of equivalent difficulty.

A67-81947
CONCRETENESS, IMAGERY AND TEMPORAL FACTORS IN PAIRED-ASSOCIATE LEARNING.
A. Daniel Yarmer (Waterloo Lutheran U., Canada).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 417–418. 10 refs.

Subjects learned a paired-associate list in which concrete, high imagery and abstract, low imagery nouns served as stimuli for nonsense syllable associates. The lengths of the study-recall intervals and intertrial intervals were varied. Performance improved over trials and was superior for concrete stimuli and longer study-recall intervals. A significant interaction indicated that abstract noun stimuli need longer study periods than concrete noun stimuli for discovery and utilization in learning.

A67-81948
RESPONSE OF PULMONARY BLOOD VOLUME TO 64 TO 114 WEEKS OF INTERMITTENT STAY AT HIGH ALTITUDES.
Sujoy B. Roy, Madan L. Bjatia, and Sneh Gadhoke (All-India Inst. of Med. Sci., Dept. of Cardiol., New Delhi).
American Heart Journal, vol. 74, Aug. 1967, p. 192–201. 21 refs. Indian Council of Med. Res. supported research.

Data on the pulmonary blood volume and related hemodynamic parameters obtained by cardiac catheter studies on 11 healthy volunteers before and after 64 to 114 wk. of intermittent stay at an altitude of 14,500 ft. were presented. The heart rate decreased by 13%, pulmonary flow increased by 60% and stroke volume increased by 77%. The central and pulmonary blood volumes showed an average increase of 97 and 76%, respectively. Pulmonary arterial and left atrial mean pressure values showed some elevation but remained within the upper limits of normal values. When the increases in the flow and blood volumes were related to the duration of total and continuous stays at high altitude, better correlation was apparent with the last continuous stay prior to the restudy than with the total stay. Although central blood volume and pulmonary flow increased within 25 wk. and remained increased, with some fluctuation, the increase in the pulmonary blood volume was apparent only after 25 wk. of stay, after which it increased progressively. It was suggested that increased pulmonary flow and pulmonary blood volume, but normal pulmonary arterial pressure, may represent a form of successful adaptation in temporary residents of high altitude.

A67-81949
PRELIMINARY OBSERVATIONS ON OCULAR EFFECTS OF HIGH-POWER, CONTINUOUS CO_2 LASER IRRADIATION.
Ben S. Fine (Armed Forces Inst. of Pathol., Ophthalmic Pathol. Branch, Washington, D. C.), S. Fine, George R. Peacock (Northeastern U., Dept. of Biophys. and Bio-Med. Eng., Boston, Mass.), Walter J. Geeraets (Depts. of Ophthalmol. and Biophys., Richmond, Va.), and Edmund Klein (Roswell Park Mem. Inst., Buffalo, N. Y.).
American Journal of Ophthalmology, vol. 64, Aug. 1967, p. 209–222. 9 refs.
Contracts DA-49-193-MD-2680, DA-49-193-MD-2436, DA-49-146-XZ-102 and Grants PHS NB-05575-03, PHS R01-RH-00361.

The various ocular changes that occur in experimental pigmented rabbit eyes subjected to laser irradiation at 10.6 μ were evaluated clinically, grossly and histopathologically. Corneal thickening and central crater formation occurred that, at high-power levels, penetrated into the anterior chamber, along with ejection of an aqueous stream. Thickened cornea consisted of both "fused" and nonfused lamellae. Some of the lesions that did not penetrate into the eye were accompanied by a depression of the anterior lens surface, apparently a result of heat transmission. Deeper intraocular changes did not occur in the nonpenetrated eye within the limited time interval between irradiation and these preliminary observations. A clear plastic face shield 0.060 in. thick was found to be an effective protection to the eye under the limited conditions of these experiments. This shield may also serve as an indicator of accidental exposure.

A67-81950
OBSERVATIONS OF SENSORY DEPRIVATION IN A LIFE-THREATENING SITUATION.
Nathan L. Comer, Leo Madow, and James J. Dixon (Inst. of Pa. Hosp., Philadelphia).
American Journal of Psychiatry, vol. 124, Aug. 1967, p. 164–169. 5 refs.

The illusions and hallucinations experienced by two miners trapped together for six days in a situation of marked reduction of sensory input were described. Their mental productions were chiefly related to wishes to be rescued, either by simple means such as doorways and stairs or by more powerful forces such as the Pope. Neither man exhibited evidence of psychosis or marked mental abnormality when examined two and three days after rescue.

A67-81951
THE KINETICS OF THE pH RISE IN ILLUMINATED CHLOROPLAST SUSPENSIONS.
S. Izawa and G. Hind (Brookhaven Natl. Lzb., Biol. Dept., Upton, N. Y.).
Biochimica et Biophysica Acta, vol. 143, Sep. 6, 1967, p. 377–390. 23 refs.
Grant NSF GB4568.

A flow method applied to a pH-measurement system was able to resolve the initial phase (<1 sec.) of the kinetics of pH changes in illuminated chloroplast suspensions. Immediately upon illumination, a rapid pH rise takes place which stops abruptly when the light is turned off; there is no significant post-illumination pH rise ('overshoot'). The marked overshoot phenomenon observed in a conventional pH recording system was analyzed and shown to be due to an instrument response lag. A graphical treatment is suggested by which ordinary pH change curves can be corrected to remove instrumental artefacts. Flash yield determinations revealed that the initial kinetics of the pH rise are biphasic. The first, rapid phase is selectively suppressed by 3-(3,4-dichlorophenyl)-1,1-dimethylurea and by 2,6-dichlorophenolindophenol. The maximal slope of the second, exponential phase of pH rise with pyocyanine, FMN and ferricyanide as electron acceptors corresponded to about 400, 150 and 100 μequiv H+/h per mg. chlorophyll, respectively (pH 6.2, 5°). Simultaneous measurement of electron transport and pH rise indicated that the maximum stoichiometry of H+ uptake, the $H+/e_2$-ratio, may be 4.0.

A67-81952
SOME EFFECTS OF RAISED INTRAPULMONARY PRESSURE IN MAN.

John Ernsting (Roy. AF Inst. of Aviation Med., Farnborough, Great Britain).
London, W. and J. Mackay and Co. Ltd., Oct. 1966, x+343 p. 289 refs. $13.40.

The nature of the disturbances induced by raising the intrapulmonary pressure by between 30 and 140 mm. Hg was investigated. It was shown that these disturbances may be reduced to within acceptable limits by applying counterpressure to certain specific body regions. Breathing at these pressures distended the lungs and induced a marked alveolar hyperventilation. The application of counterpressure to the trunk reduced these effects and was essential at positive pressures greater than 40 mm. Hg. The use of an oronasal mask for pressure breathing allowed distension of the mouth and pharynx, increased activity of the carotid baroreceptors and hemorrhages in the conjunctivae and tympanic membrane. Counterpressure to the head and neck was required at positive pressures above 65 mm. Hg. Raising the intrapulmonary pressure reduced the effective blood volume and collapse occurred when the reduction exceeded 700 to 800 ml. These collapses, which have all the features of vasovagal syncope, may also be precipitated during pressure breathing by hypoxia, hyocapnia, discomfort or pain. The magnitude of the reduction of effective blood volume was decreased by applying counterpressure to the limbs, but the cardiovascular disturbances induced by pressure breathing limited the time for which this maneuver was used at high altitude. It has been shown, however, that provided the duration of an exposure was less than four min., pressure breathing with limited counterpressure will provide protection against hypoxia at altitudes of up to 70,000 ft.

A67-81953
PROBLEMS OF ALVEOLAR CAPILLARY O_2-DIFFUSION WITH REGARD TO AGE AND EXPENDITURE IN BUSINESS LIFE [PROBLEME DER ALVEOLO-KAPILLAREN O_2-DIFFUSION IM HINBLICK AUF ALTERUNG UND AUFBRAUCH IM ERWERBSLEBEN].
M. Scherrer (Med. Universitätsklin., Bern, Switzerland).
Arbeitsmedizin Sozialmedizin Arbeitshygiene, vol. 2, Mar. 1967, p. 108–111. 70 refs. In German.

The steady state O_2 diffusion capacity ($D_L.O_2$) at rest was 35.3±5.8 ml./min. mm. Hg among 20 yr. old, healthy men and 23.0±7.3 ml./min. mm. Hg among 70 yr. old men. During hard work the $D_L.O_2$ increased to 120.7±26.8 ml./min. mm. Hg in the younger men, 78.4±15.5 ml./min. mm. Hg in 20 yr. old women and 51.9±9.0 ml./min. mm. Hg in 50 yr. old men. The dependence of $D_L.O_2$ on age was statistically established. At rest it was found that for extensive reversible bronchostenosis in lung emphysema, the $D_L.O_2$ at 27.9±12.0 ml./min. mm. Hg was normal. Compared with that, the $D_L.O_2$ was lowered statistically to 14.7±7.9 ml./min. mm. Hg in the case of equally serious lung emphysema with irreversible bronchostenosis as a sign of interalveolar septum atrophy, and even to 13.1±4.0 ml./min. mm. Hg in the case of chronic decompensation cor pulmonale. With silicosis I, the work $D_L.O_2$ remained normal in 9 out of 11 cases at 48.5±11.1 ml./min. mm. Hg. With silicosis II, the decrease was slight, but statistically lower at 36.3±10.0 ml./min. mm. Hg than with silicosis I. The decrease was found in only 8 of 14 from the normal range. Ubiquitous smoke, dusts, vapors and exhaust gases all seem to be responsibe for the $D_L.O_2$ decreases during the course of life through sclerosis and septa atrophy in the lungs of elderly human beings.

A67-81954
EFFECT OF SIGNAL DELAY ON AUDITORY DETECTION WITH GATED NOISE.
W. A. Wilbanks (Miss. U., University).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 393–394. 12 refs.

Monaural and binaural detection of a gated signal is more difficult when the noise is gated simultaneously with the signal than when the noise is continuous. As the onset of the signal is delayed, binaural detection improves quite rapidly. Monaural detection improves with signal delay, but at a slower rate. The results are interpreted in terms of signal detection theory.

A67-81955
MASKING OF CONTOUR-DETECTORS IN THE HUMAN VISUAL SYSTEM.
Alberta S. Gilinsky (Bridgeport U., Conn.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 395–396. 7 refs.
Grants NSF GB-6067.

Inspection of horizontal, vertical, or diagonally oriented line gratings differentially affects the ability to detect test contours as a function of their orientation. The orientation-specific effects on visual acuity are systematic functions of the duration of adaptation to the patterns of light and dark lines.

A67-81956
VISUAL PERCEPTION IN THE DETERMINATION OF SPACECRAFT ATTITUDE.
Joseph Puig (Grumman Aircraft Eng. Corp., Bethpage, N. Y.) and Robert Zenhausern (St. John's U., Jamaica, N. Y.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 397–398.
NASA Contract NAS 9-1100.

A simulation experiment was conducted in order to evaluate the effectiveness of a colored light pattern in providing cues necessary to determine spacecraft orientation. The light pattern proved effective in providing these cues.

A67-81957
CODE OF PRACTICE AGAINST RADIATION HAZARDS.
Imperial Coll. of Science and Technology.
London, London U., 1966, v+44 p.

The first part of the code is concerned with the basic control procedures used when carrying out work involving sources of ionizing radiation. Included are sections on the radiation safety committee, registration procedures, radiation warming signs, protection of personnel, accidents and emergencies and other procedures. The second part treats the procedures in greater detail and gives advice on good practice through which external and internal radiation exposure from such sources may be minimized.

A67-81958
THE EFFECT OF INSTRUCTIONS UPON NECKER CUBE REVERSAL.
Laura Wolf, Glenna Ford, Rosemary Cogan, and Dennis Cogan (Tex. Technol. Coll., Lubbock).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 399–400. 6 refs.

The effect of ego-involving suggestion on perception of Necker Cube reversals was examined. It was hypothesized that subjects told that "intelligent people see more reversals," would report more reversals (Group H–H), and subjects told that "intelligent people see less reversals," would report less reversals (Group H–L). Both groups were expected to differ from a non-suggestion group (Group C). The difference between groups was reliable. Multiple comparisons indicated that Group H–L had reliably fewer reversals that either Group C or Group H–H, which did not differ

from each other. The lack of difference between Groups H–H and C may have been due to an elevation of reversal rate in Group C because of the achievement motivation characteristic of the college student.

A67-81959
EFFECTS OF AUDITORY PITCH AND COMPLEXITY ON EEG DESYNCHRONIZATION AND ON VERBALLY EXPRESSED JUDGMENTS.

D. E. Berlyne, P. McDonnell, R. M. Nicki, and L. C. C. Parham (Toronto U., Ontario, Canada).

Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 346–367. 30 refs.
Grants NIMH MH-06324, OMHF 70, NRC, Canada APB-73, and NRC, Canada APT-73.

In five experiments, electroencelphalographic (EEG) responses were recorded and verbal ratings of "complexity", "pleasingness" (or "pleasantness"), and "interestingness" were obtained from subjects exposed to auditory patterns of varying pitch and complexity. Mean duration of desynchronization was a U-shaped function of pitch, and white noise produced significantly longer desynchronization than pure tones both when equated for intensity and when equated for loudness. No significant difference was found between the mean durations for pairs of tones and single tones or for consonant pairs and dissonant pairs. Judged "complexity" did not follow objective criteria of complexity. The various ratings are discussed in relation to one another, to EEG effects, and to the results of previous experiments in which visual patterns were subjected to similar judgments.

A67-81960
HEAT: BIOLOGICAL EFFECTS, INDUSTRIAL HYGIENIC SIGNIFICANCE AND PROTECTIVE POSSIBILITIES [HITZE BIOLOGISCHE WIRKUNGEN, ARBEITSHYGIENISCHE BEDEUTUNG UND SCHUTZMOGLICHKEITEN].

Karl Heinz Richter (Karl-Marx-U., Lehrstuhl für Arbeitshyg., Leipzig, East Germany).

Berlin, Staatsverlag der Deut. Demokratischen Rep., 1966, 404 p. In German.

Physiological effects of heat were given with their industrial hygienic significance and protective possibilities. Included were: (1) the foundation of hot climate evaluation; (2) the measurement of hot climates; (3) heat radiation intensity during rubber and fuel burning; (4) the effect of heat on humans; (5) the heat-tolerance threshold for humans; (6) heat damage and first aid; (7) the manner and threshold of body protection against heat effects; and (8) the heat effects of different materials.

A67-81961
CATARACT PRODUCTION BY ULTRASOUND.

Richard T. Torchia, Edward W. Purnell, and Adnan Sokollu (Western Reserve U., School of Med., Dept. of Ophthalmol. and U. Hosps., Cleveland, Ohio).

American Journal of Ophthalmology, vol. 64, Aug. 1967, p. 305–309. 7 refs.
Grant NIH NB-03413 and Ohio Lions Club supported research.

By working with short pulse durations a disporportionately large amount of sound energy may be passed through the lens without producing cataracts as seen in the rabbit.

A67-81962
HEMODYNAMIC EFFECTS OF CHANGES IN ARTERIAL CARBON DIOXIDE TENSION DURING INTERMITTENT POSITIVE PRESSURE VENTILATION.

Beverly C. Morgan, Edward W. Crawford, Thomas F. Hornbein, Wayne E. Martin, and Warren G. Guntheroth (Wash. U., School of Med., Seattle).

Anesthesiology, vol. 28, Sep.–Oct. 1967, p. 866–873. 17 refs.
Grants PHS HE 7945, PHS HE 9617, PHS HE 08866, and PHS HE 03998.

Hemodynamic effects of changes in arterial carbon dioxide tension (P_{CO_2}) during intermittent positive pressure ventilation (IPPV) were studied in lightly anesthetized dogs following recovery from implantation of pulsed ultrasonic flow transducers on aorta and vena cava. Alveolar ventilation was maintained in excess of normal, and arterial P_{CO_2} was varied by alteration of inspired CO_2 concentration. Data were obtained at Pa_{CO_2} 20, 40 and 60 torr, and at each Pa_{CO_2} high (peak airway pressure 30 cm. of water, inspiratory to expiratory ratio of 2:1) and low (peak airway pressure 10 cm. of water, inspiratory to expiratory ratio of 1:2) levels of ventilation were employed. Two separate hemodynamic effects were observed, the effects of changes in intrathoracic pressure and those produced by alterations in Pa_{CO_2}. At each Pa_{CO_2} high level of ventilation decreased stroke volume and cardiac output compared to low level of ventilation. At each level of ventilation, stroke volume and cardiac output were decreased during respiratory alkalosis and increased during respiratory acidosis.

A67-81963
IMPROVING INSPECTOR PERFORMANCE THROUGH TRAINING AND VISUAL AIDS.

Fred B. Chaney and Kenneth S. Teel (North Am. Aviation, Inc., Autonetics, Anaheim, Calif.).

Journal of Applied Psychology, vol. 51, Aug. 1967, p. 311–315.

An experimental study was performed to evaluate, singly and in combination, the effectiveness of a four-hr. training program and a set of visual aids designed to improve the performance of 27 experienced machined-parts inspectors. The criterion used was the percentage of true defects detected in a selected sample of machined parts. Findings indicated that (a) use of training alone resulted in a 32% increase in defects detected, (b) use of visual aids alone resulted in a 42% increase, and (c) use of both resulted in a 71% increase, while (d) performance of the control group did not change.

A67-81964
DYNAMIC CENTRAL SCOTOMETRY.

T. Shipley, R. Wayne Jones, and A. Fry (Miami U., Dept. of Ophthalmol., Fla.).

Journal of Applied Psychology, vol. 51, Aug. 1967, p. 340–345. 15 refs.
Contract DA-49-193-MD-2344.

Using radioactivated light sources and two levels of preadaptation, with seven subjects, the size of the central scotoma is measured as a function of time in the dark. The recovery time to initial sighting is shown to be a function of the level of preadaptation, but the subsequent rate of scotoma collapse is not. Thus this rate of decrease in size is a reliable psychophysical index of vision in normal observers. The possible applicability of this measure to questions of vision screening is noted.

A67-81965
FEEDBACK IN A COMPLEX MULTIMAN–MACHINE SYSTEM.

Irwin L. Goldstein, Jack F. Southard, and David A. Schum (Ohio State U., Columbus).

Journal of Applied Psychology, vol. 51, Aug. 1967, p. 346–351. 14 refs.
Contract AF 33(615)-2248

Human decision makers provided hypotheses and made diagnoses, in the form of conditional probability judgments, to account for the occurrence of certain critical events in a simulated hostile environment. The decision makers' probabilistic estimates were compared with similar estimates provided by a Bayesian model for several levels of percentage of knowledge of results (KR; 0%, 33%, 67%, and 100%) and two levels of specificity of KR (access or no access to model estimates). The data indicated that there were no significant differences in the probabilistic estimates provided for 33%, 67%, and 100% KR but that all three were superior to 0% KR. The human decision makers with access to Bayesian model estimates as feedback were not able to improve their judgments significantly even though the model-generated solutions were significantly superior to human estimates at all KR levels above 0%.

A67-81966

ELECTROENCEPHALOGRAMS FROM NEOCORTEX AND LIMBIC SYSTEM DURING TEMPERATURE REGULATING RESPONSES OF THE RABBIT.

Osamu Takatani, Moto Uechi, and Yoshio Nakamura (Tokyo U., School of Med., Inst. of Brain Res., Dept. of Med. and Dept. of Neurophysiol., Japan).

Experimental Neurology, vol. 18, Aug. 1967, p. 392–403. 13 refs.

The electroencephalogram (EEG) and behavior of rabbits were observed during temperature regulating responses evoked by high environmental temperature, a pyrogen and an antipyretic agent. The EEG was recorded from the amygdala, hippocampus and neucortex in order to follow the changes in the activity of the ascending activity systems in the anterior hypothalamus, the posterior hypothalamus and the mesencephalic reticular formation. The behavioral changes showed a definite sequence of several phases which were distinguished from one another by the relationship between the rectal and the ear lobe temperature. In the heat loss response characterized by the falling of a high body temperature and an elevated ear lobe temperature, the animal lay prone on the floor. The eyes narrowed and the ear lobes became limp. The EEG of this state was characterized by synchronized activity in the neocortex, high-voltage slow waves in the amygdala and irregular fast waves with spikes in the hippocampus. In the heat productive response characterized by a low ear-lobe temperature and rising body temperature, the animal was rigid. Low-voltage fast waves were observed in the neocortex and the amygdala, and regular slow waves were seen continuously in the hippocampal EEG. It was inferred that the ascending activating system in the posterior hypothalamus is depressed during heat loss responses and enhanced during heat productive response.

A67-81967

INFLUENCE OF INTERPOLATED PERIODS OF ACTIVITY AND INACTIVITY UPON THE VIGILANCE DECREMENT.

William Bevan, Lloyd L. Avant, and Harry G. Lankford (Kan. State U., Manhattan).

Journal of Applied Psychology, vol. 51, Aug. 1967, p. 352–356. 32 refs.
Contract Nonr 3634(01).

Four independent groups were observed in a simple visual detection task. The control group, which monitored the display continuously for 90 min., suffered a reliable decrement in performance during the course of observation. One experimental group engaged in vigorous physical exercise for five-min. after each 30 min. of watch-keeping, the second group solved anagrams for five-min. periods, and the third was subjected to five-min. periods of sensory restriction. All of the experimental groups performed the vigilance task at a high level—with no decrement—throughout. The implications of these results for the significance of successive change in input are discussed.

A67-81968

TRANSOCEANIC RADIO TRANSMISSION OF ELECTROCARDIOGRAMS.

Jim C. Hirschman, Thomas J. Baker, and Arthur F. Schiff.

Diseases of the Chest, vol. 52, Aug. 1967, p. 186–190. 6 refs.

The successful transmission of electrocardiograms (ECGs) from Guinea in Africa to Miami, Florida is reported. The equipment used in standard, not overly expensive, and readily available. The methods used are recommended for ships at sea, isolated hospitals and emergency situations. The techniques can be applied to biomedical data of similar nature from other organs such as spirograms, pnemotachograms, and EEGs. In fact, they have been applied to phonocardiograms. Such radiocommunications increase the diagnostic coverage of emerging computer centers for mass health screening surveys and biomedical data interpretation.

A67-81969

FACTORS THAT DIMINISH RADIATION LETHALITY.

Sherwood M. Reichard (Ga. Med. Coll., Div. of Radiobiol., Dept. of Radiol., Augusta).

(Radiol. Soc. of North Am., 52nd Sci. Assembly and Ann. Meeting, Chicago, Ill., Nov. 27–Dec. 2, 1966).
Radiology, vol. 89, Sep. 1967, p. 501–508. 46 refs.
Grant PHS HE 08982

Protection against the lethal effects of radiation was obtained by several procedures that alter the reticuloendothelial system (RES). Thus, trauma resistance produced in rats through repeated exposures to sublethal doses of shock, previously shown to be associated with the RES, reduced the mortality following 750 r x-irradiation from 80 to 25%. Impairing the function of the RES eliminated this acquired resistance to both traumatic shock and x-irradiation. Extracts prepared from the spleens and plasma of resistant animals and administered to normal animals were found to protect them against radiation lethality. Other procedures which stimulate phagocytic activity of the RES such as injections of zymosan, a cell wall preparation of yeast, repeated injections of saccharated iron oxide, denatured human serum albumin aggregate and administration of bacterial endotoxins also increased survival to x-irradiation. In all instances, impairment of the RES overcame this protection. A humoral mechanism seems to be involved, since protection can be passively transferred to otherwise unprotected rats. The RES, therefore, seems to be concerned with the production or concentration of an active factor capable of altering physiological adaptation to traumatic shock and x-irradiation.

A67-81970

EFFECT OF LOW ENVIRONMENTAL TEMPERATURE ON THE METABOLISM OF VITAMIN A (RETINOL) IN THE RAT.

P. R. Sundaresan, Victoria G. Winters, and Donald G. Therriault (U.S. Army Res. Inst. of Environ. Med., Biochem.–Pharmacol. Div., Natick, Mass.).

Journal of Nutrition, vol. 92, Aug. 1967, p. 474–478. 16 refs.

The effects of low environmental temperature on liver vitamin A utilization of rats were examined after two, four and six weeks of exposure at 5°. Total liver vitamin A levels were unchanged. The weight gain of animals at 5° was always less than the weight gain at 25°. An increased utilization of vitamin A was indicated if the utilization of the vitamin was expressed as a ratio of the amount of vitamin A removed from the liver to the weight gain of

the animal. The increase in the vitamin A depletion ratio observed in the four-wk. cold-exposed rats was abolished by administration of thiouracil at a level of 0.1% in the diet. An increased requirement for vitamin A in the cold was indicated by the reduced survival time of vitamin A-deficient rats exposed to cold. In addition, at least 20 times more retinoic acid was necessary to maintain growth and survival in the cold than at 25°.

A67-81971
CARBON DIOXIDE AND CEREBRAL CIRCULATORY CONTROL. I. THE EXTRAVASCULAR EFFECT.

M. N. Shalit, S. Shimojyo, and O. M. Reinmuth (Miami U., School of Med., Dept. of Neurol., Fla.).

(Am. Heart Assn., New York, Oct. 22, 1966).
Archives of Neurology, vol. 17, Sep. 1967, p. 298–303. 23 refs.
Grants PHS 1 FO 5-TW-906-01 and PHS NB 05820-01.

The possibility that carbon dioxide (CO_2) has an influence on the regulation of cerebral blood flow (CBF) that is independent of a direct effect on vascular smooth muscle was tested by elevation of cerebrospinal fluid (CSF) carbon dioxide tension (P_{CO_2}) while maintaining a constant low arterial P_{CO_2} in five greyhound dogs. The CBF increased markedly as measured by preliminary nitrous oxide measurement and subsequent narrowing of cerebral arteriovenous oxygen content values. That this result was not due to rapid solution of CO_2 in the cortical mantle appeared established by failure of draining venous blood to show an elevation of CO_2. The extravascular response demonstrated was not mediated by the resultant drop in CSF pH since acidification of the spinal fluid with ammonium chloride in three animals did not affect CBF. The result allows the speculation that a neural reflex mechanism responding to CO_2 may exist for alteration of CBF.

A67-81972
MONITORING EYE MOVEMENTS DURING THE LEARNING OF HIGH AND LOW MEANINGFULNESS PAIRED-ASSOCIATE LISTS.

P. D. McCormack and T. E. Hannah (Carleton U., Ottawa, Canada).

Psychonomic Science, vol. 8, Aug. 5, 1967, p. 443–444. 8 refs.
Grant NRC, Canada APA-78.

Eye movements were monitored as subjects learned a high (Group H) and a low (Group L) m′ PA list. The learning for Group H was superior while the fixation functions of the two groups did not differ reliably. These data, and others, were interpreted as being consistent with a two-stage conceptualization, with the first stage being relatively brief and with Group L subjects exhibiting some difficulty with it.

A67-81973
FREE RECALL OF CATEGORIZED AND UNRELATED WORDS UNDER SERIAL OR GROUPED PRESENTATION.

Phyllis Greenhouse.

(Eastern Psychol. Assn., Boston, Apr. 6, 1967).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 447–448. 7 refs.

Sixty subjects were presented a list of 52 categorized or unrelated words for three free recall trials. The items of the list were read either serially or temporally grouped. The initial effect of the temporal procedure was to depress number of categories in recall. By Trial three it had facilitated both the number of words and clusters in the recall of unrelated words and the number of categories of related words.

A67-81974
SHORT-TERM MEMORY, WORD CLASS, AND SEQUENCE OF ITEMS.

Henry Loess (Wooster Coll., Ohio).

Journal of Experimental Psychology, vol. 74, Aug. 1967, p. 556–561. 10 refs.
Grant NIH MH 08537-02.

One hundred twenty subjects received 24 word triads in a Peterson-type short-term memory test. Items contained high or low frequency words, were homogeneous or heterogeneous with respect to taxonomic category, and successive tests of a given category were massed or distributed over the trials. When massed, retention was maximum for the first item of a category, significantly poorer in most cases for the second and third; when distributed, no loss occurred for retention of words, a slight loss for intra-item position. Heterogeneous items showed maximum proactive interference (PI) after one trial. Word frequency did not interact with the other variables. The interpretation was that PI did not develop across taxonomic classes and that within classes it dissipated if items were sufficiently spaced.

A67-81975
LEFT–RIGHT FIELD DIFFERENCES WITH PARTIAL REPORT OF LETTERS.

Robert E. Fitzgerald and A. J. Marshall (Western Australia U., Perth).

American Journal of Psychology, vol. 80, Sep. 1967, p. 370–376. 12 refs.

Eight letters were exposed horizontally across fixation for 300 m.sec. in a tachistoscope. A signal tone sounding simultaneously with the offset of the exposure-flash instructed subjects to report the letters on the left or the right of fixation. Letters on the right were reported more accurately than those on the left. A control condition with four letters, but with all to be reported, showed a strong left field superiority. This finding of right field superiority with partial report is analogous to that obtained when letters are presented in one field at a time. It was concluded that a major factor determining the field differences in the perception of letter patterns reported in earlier studies is whether the letters to be reported come from one or both sides of fixation, irrespective of the positioning of the letters in the stimulus-pattern.

A67-81976
MULTITRIAL FREE RECALL AS A FUNCTION OF CONSTANT VERSUS VARIED INPUT ORDERS AND LIST LENGTH.

John Jung and Stacey Skeebo (York U., Toronto, Ontario, Canada).

Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 329–336. 7 refs.
Grant NRC APA-131.

Higher multitrial free recall occurred when the input order was constant rather than varied over trials for a list of 24 words but not for a 12-word list. The temporal pattern of recall over Trials one-six shifted such that items from the front of the list were recalled earlier with the constant order and items from the end of the list were recalled earlier with the varied order condition, especially with the short list. It was hypothesized that recall with the constant order was better since subjects could anticipate successive items during input trials, thus forming direct associations which was not possible with the varied order.

A67-81977
RELATIONSHIP BETWEEN EMOTIONALITY, DRUG EFFECTS, AND AVOIDANCE RESPONSES IN TRYON S_1 AND S_3 STRAINS.

Barbara J. Powell, L. K. Martin, and D. K. Kamano (Galesburg State Res. Hosp., Ill.).
Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 294–300. 9 refs.

Whether drugs will raise or lower performance under stress has been shown to depend, in part, upon the emotionality of the subject. After demonstrating that the Tryon S_1 strain was more emotional than the Tryon S_2 (as measured in the open field) and that males of each strain were more emotional than their respective females, the avoidance behavior of these animals under placebo, or 20 or 40 mg./Kg. of amobarbital was shown to relate to the emotionality differences. Regardless of whether the comparison is between strains or sexes, at a moderate dosage level the high emotional groups emitted more CARs than low emotionals and, in addition, at a relatively heavy dosage, the decrease in number of CARs was more apparent in the low emotional groups. The results suggest that regardless of their source, these emotional differences tend to relate to differential drug effects in a reasonable consistent and predictable manner.

A67-81978
CONJUNCTIVE AND DISJUNCTIVE CONCEPT LEARNING IN HUMANS AND SQUIRREL MONKEYS.
Herbert Wells and Kenneth Deffenbacher (Wash. U., Seattle).
Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 301–308. 14 refs.
Grant PHS MH 12309-01 and Wash. U. supported research.

Each of 40 humans and 16 squirrel monkeys learned both a conjunctive and a disjunctive concept in a choice procedure in which a positive and a negative instance were presented on each trial. There were two relevant and two irrelevant dimensions. Humans found disjunctive concepts more difficult, but this trend was slightly reversed for the monkeys. Monkeys were more influenced by the nature of the relevant dimensions than were humans. Vincent learning curves showed improvement prior to criterion in all cases, in agreement with the Trabasso–Bower model for two-cue concept learning. Results were discussed in terms of hypothesis testing and discrimination learning models of conceptual behavior.

A67-81979
FAMILIARITY OF LETTER SEQUENCES, RESPONSE UNCERTAINTY, AND THE TACHISTOSCOPIC RECOGNITION EXPERIMENT.
D. J. K. Mewhort (Waterloo U., Ontario, Canada).
(Eastern Psychol. Assn., Meeting, Boston, Apr. 1967).
Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 309–321. 18 refs.
Grant DRB, Canada 9401-26.

Subjects shown paired pseudo-words (either 0-order or 4-order approximation to English) for 100 msec. were instructed post-exposurally to identify letters from one of the pseudo-words. Approximation to English not only of the pseudo-words reported, but also of those not reported, affected accuracy of identification. Delaying the post-exposure instruction cue 400 msec. reduced performance equally for both kinds of material. It appeared that the subject processes all the material, not just that reported, and that a limited capacity system, rather than output uncertainty (response bias) is required to explain the superior recognition of familiar materials.

A67-81980
INFANTILE STIMULATION AND THE YERKES–DODSON LAW.
Allan M. Smith (McGill U., Montreal, Canada).
Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 285–293. 17 refs.
McGill U. supported research.

Six groups of C57B1/6J mice were exposed to varying intensities of preweaning stimulation. One group of animals was not handled whereas others were handled or subjected to 0.2 ma., 0.4 ma., 0.6 ma., or 0.8 ma. of shock for 90 sec. from the day of birth to day 10. At 21 days, animals were sexed and weaned. At 40 days all animals commenced training on one of a position response task, brightness discrimination, or pattern discrimination. Stimulation seemed to produce poorer learning on the easy task but significantly improved learning on the intermediate and difficult tasks. A second experiment tested a group of high and low levels of infantile stimulation animals on successive spatial reversals. Low stimulation subjects were better than high stimulation subjects on the first day of training but on the first reversal (i.e., day 2) the high stimulation subjects needed fewer trials to criterion. Implications for Denenberg's monotonicity theory are discussed.

A67-81981
THE DIFFERENTIAL EFFECT OF STIMULUS INTENSITY ON REHEARSED AND UNREHEARSED MATERIAL IN SHORT-TERM AUDITORY MEMORY.
Ronald L. Cohen (Uppsala U., Psychol. Lab., Sweden).
Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 277–284. 11 refs.
Swed. Council for Social Sci. Res. supported research.

The effect of varying the stimulus intensity (loudness) on the recall of nine-digit sequences, auditorily presented, was investigated using two presentation rates. At one digit/sec. and with instructions for 3,3, and 3 rehearsal grouping, stimulus intensity was found to be a variable only in the case of the last 3 digits, which according to rehearsal instructions were unrehearsed. No effect was found on the first six (rehearsed) digits. At 4 digits/sec., a rate too fast for systematic rehearsal, the stimulus intensity affected the recall of the first six digits as well of the last three. These results are discussed in relation to the question of whether or not the stimulus memory trace and the rehearsal memory trace should be regarded as two separate entities. The question of presentation rate and performance is also briefly discussed.

A67-81982
STABILITY OF THE HYPOCALCEMIC ACTIVITY OF PORCINE THYROCALCITONIN.
Armen H. Tashjian, Jr. and Dorothy R. Warnock (Harvard School of Dental Med., Pharamcol. Dept. and Harvard Med. School, Dept. of Pharmacol., Boston, Mass.).
Endocrinology, vol. 81, Aug. 1967, p. 306–318. 28 refs.
Grant NIAMD AM-10206.

Porcine thyrocalcitonin was modified by enzymatic and chemical treatment for the purpose of studying the interrelationships between structure and hypocalcemic activity. Enzymatic treatment with trypsin, chymotrypsin, pepsin and polyphenyl oxidase led to rapid and complete inactivation of the hypocalcemic activity. We conclude from these experiments that thyrocalcitonin either is a simple polypeptide or contains a peptide moiety which is absolutely essential for hypocalcemic activity. Incubation of thyrocalcitonin in dilute HCl or neutral Tris buffer at elevated temperature was accompanied by gradual loss of activity. Inactivation was also seen after treatment with hydrogen peroxide, photooxidation and treatment with n-bromosuccinimide, results demonstrating that there is at least one site in the thyrocalcitonin molecule that is sensitive to oxidation. The hypocalcemic activity which was lost during

incubation with hydrogen peroxide could not be recovered by treatment of the oxidized products with cysteine, 2-mercaptoethanol or dithiothreitol. There were no detectable changes in hypocalcemic activity either after enzymatic treatment with carboxypeptidase. A leucine aminopeptidase and neuraminidase, or after chemical treatment with 2-OH-5-nitrobenzyl bromide, N-acetylimidazole, p-OH-mercuribenzoate, iodoacetate and cyanogen bromide.

A67-81983
AEROSPACE FEEDING: ACCEPTABILITY OF BITE-SIZE AND DEHYDRATED FOODS.

May J. O'Hara, Roy E. Chapin, Norman D. Heidelbaugh, and John E. Vanderveen (USAF School of Aerosapce Med., Aerospace Med. Div., Brooks AFB, Tex.).

(Am. Dietetic Assn., 49th Ann. Meeting, Boston, Oct. 27, 1966). Journal of the American Dietetic Association, vol. 51, Sep. 1967, p. 246–250. 8 refs.
NASA supported research.

A diet composed of 19 bite-size foods, 27 dehydrated foods, and five beverages was fed to four young men for 40 days, with mandatory total food consumption for 36 days. Food acceptability ratings, made by each subject when the foods were eaten, showed that personal preferences were an important factor in the degree of like or dislike of individual items. Many items received lower ratings as the study progressed, suggesting that they were fed too frequently or that several tasting experiences were necessary before the rating would remain constant. The data indicated that a greater variety of bite-size and dehydrated foods should be developed for aerospace feeding systems and that crew members should have an opportunity to evaluate the available food items for use in individual menus.

A67-81984
THE SPACECRAFT ATMOSPHERE.

Ronald G. Neswald.

Space/Aeronautics, vol. 48, Aug. 1967, p. 71–82.

The suitability of nitrogen, helium and neon as diluents for the cabin atmosphere in spacecraft was discussed. Both chemical and physical effects were subjects of concern and differences of opinion among researchers. Pulmonary problems, problems associated with decompression and problems of ignition and deflagration were considered in relation to the various gases used as diluents. Designs of physical systems for the recovery of oxygen from carbon dioxide were included. Atmosphere selection for spacecraft was seen to be associated with many problems and difficulties.

A67-81985
ELECTROCARDIOGRAPHIC CHANGES IN CLINICALLY NORMAL OLDER MEN FOLLOWING NEAR MAXIMAL AND MAXIMAL EXERCISE.

F. Martin Lester, L. T. Sheffield, and T. Joseph Reeves (Ala. U., Depts. of Med. and Physiol., Birmingham).

Circulation, vol. 36, Jul. 1967, p. 5–14. 9 refs.
Grants PHS HE-05080-06 and PHS 2M01 FR-32-06.

One hundred fourteen male volunteers ranging in age from 40 to 75 yr. were studied by both near maximal and maximal exercise testing. All subjects were considered normal by history and physical examination. Electrocardiographic responses to exercise testing were monitored by telemetered bipolar leads during and immediately after exercise and by standard electrocardiographic leads made during the recovery period between 30 sec. and five min. after the termination of exercise. Both near maximal and maximal exercise testing were accomplished without significant complication. The incidence of segmental ST depression following the near-maximal test was less than 1%. The incidence of segmental ST depression following the maximal exercise test was 5.2% (6–114). Only one of the five abnormalities detected during or after maximal exercise persisted for more than 30 sec. after the conclusion of exercise. Since such changes occur in a high percentage of patients with heart disease, such changes appear to have a high degree of specificity for some form of cardiac abnormality.

A67-81986
THE PULMONARY REACTIONS TO TOXIC GASES.

Paul Gross, William E. Rinehart, and Robert T. P. deTreville (Pittsburgh U., Graduate School of Public Health and Ind. Hyg. Found., Mellon Inst., Pittsburgh, Pa.).

(Am. Ind. Hyg. Assn., Ann. Meeting, Chicago, Ill., May 1–5, 1967). American Industrial Hygiene Association Journal, vol. 28, Jul.–Aug. 1967, p. 315–321. 8 refs.

The deep pulmonary response to toxic gases depends upon which of the two components of the alveolar wall is responding, the capillary or the alveolar membrane. Injury to the capillary results in pulmonary edema or bronchopneumonia. Whereas, a dose of irritant injuring substantially only the alveolar membrane causes the latter to respond with the development of a multi-layered cell mass that is supported by argyrophilic fibers. Because collagenization of this stroma does not usually occur, such septal lesions caused by noxious gases resolve. The respiratory bronchiole is the site of predilection of lesions caused by deep lung irritants because of delayed clearance in this region.

A67-81987
A SURVEY OF HEARING CONSERVATION PROGRAMS IN REPRESENTATIVE AEROSPACE INDUSTRIES. PART I. PREVALENCE OF PROGRAMS AND MONITORING AUDIOMETRY.

William F. Rintelmann and Donald C. Gasaway (USAF School of Aerospace Med., Dept. of Ear, Nose and Throat, Audiol. Sect., Brooks AFB, Tex. and Mich. State U., Audiol. and Speech Sci. Dept., East Lansing).

American Industrial Hygiene Association Journal, vol. 28, Jul.–Aug. 1967, p. 372–380. 16 refs. Grant NIH NB-01310.

Questionnaires were sent to 600 assorted aerospace industrial firms. Responses were received from 336 firms. Fifty-three companies reported having fully developed hearing conversation programs. Responses were categorized and analyzed according to: (1) general descriptive information; (2) monitoring of hearing conservation programs; and (3) types of audiometric tests, test environments, instrumentation and administration of audiometric tests.

A67-81988
INFLUENCE OF AGE ON THE HEMODYNAMIC RESPONSE TO EXERCISE.

Stevo Julius, Antoon Amery, Leigh S. Whitlock, and James Conway (Mich. U., School of Public Health, Ann Arbor).

Circulation, vol. 36, Aug. 1967, p. 222–230. 26 refs.
Grants PHS CD-00081 and PHS 5 TI GM-892.

Respiratory and hemodynamic measurements were made on 54 sedentary subjects during progressive exercise on a bicycle ergometer up to the point of maximal voluntary effort. The age range of the group was from 18 to 68 yr. The maximum tolerated exercise, as indicated by the highest achieved level of oxygen consumption ($\dot{V}_{O_2}$), diminished with age. Older subjects had a lower resting cardiac output ($\dot{Q}$) than normal subjects, but an identical increase in $\dot{Q}$ with $\dot{V}_{O_2}$. There was no evidence of flattening of this curve as the older subjects approached highest exercise loads.

Consequently, the arteriovenous oxygen difference did not increase abnormally on high loads, and the cardiac response to exercise in older subjects appeared to be adequate. The relationship between inspired air volume and heart rate with $\dot{V}_{O_2}$ at submaximal loads was not influenced by age. Systolic pressure increased progressively with exercise and showed a greater change in older subjects. Total peripheral resistance at rest increased with age; but with increasing exercise, this difference progressively diminished.

A67-81989
AROUSAL THRESHOLD RANGES.

Charles P. Pollak, Elliot D. Weitzman, and Daniel F. Kripke (Albert Einstein Coll. of Med., Saul R. Korey Dept. of Neurol., New York City, N. Y.).

Archives of Neurology, vol. 17, Jul. 1967, p. 94–102. 32 refs.
Grants NIH MY-4921 and NIH NB-03356.

The pontine and mesencephalic reticular formation, nucleus centrum medianum of the thalamus, and hippocampus were repeatedly stimulated during nighttime sleep of the monkey. Arousal threshold current ranges were determined during successive stages of the cyclic sleep electroencephalogram pattern. The range of electric current required to produce arousal during rapid eye movement (REM) sleep periods greatly exceeded that required during other (nonrapid eye movements [NREM]) sleep stages in all areas that were stimulated. Arousal threshold ranges during REM sleep were subject to large and sudden variations. This was not the case during periods of NREM sleep. Stimulus-induced arousal from REM sleep, at the high current levels required, differed behaviorally from that induced during NREM sleep. Consistent differences between the arousal threshold ranges associated with the various NREM sleep stages could not be demonstrated.

A67-81990
CONTINGENT NEGATIVE VARIATION AND EVOKED RESPONSES RECORDED BY RADIO-TELEMETRY IN FREE-RANGING SUBJECTS.

W. Grey Walter, R. Cooper, H. J. Crow, W. C. McCallum, W. J. Warren, V. J. Aldridge, W. Storm van Leeuwen, and A. Kamp (Burden Neurol. Inst., Bristol, Great Britain and Inst. of Med. Physics, T.N.O., Utrecht, The Netherlands).

Electroencephalography and Clinical Neurophysiology, vol. 23, Sep. 1967, p. 197–206. 19 refs.
Med. Res. Council supported research.

Using an 8-channel radio-telemetry system (RTE) records were obtained of the EEG, pulse rate, respiration, evoked responses and Contingent Negative Variation (CNV) in four normal subjects and three patients with intracerebral electrodes. The subjects were free to move about within 30 m. of the receiving aerial. Two RTE channels were modified to provide time constants of seven sec. Auditory stimuli, synchronized with the operation of average response computers, were transmitted to the subjects by a separate radio-control link. These were used as conditional and imperative signals to the subjects to perform various tasks: pressing a button to arrest the imperative signals, turning the pages of a book inserting pegs in a peg-board and coming to a stop on a bicycle. Responses to the signals were averaged on line with two barrier-grid tubes and a 2-channel Enhancetron and the intrinsic rhythms were analyzed with a 2-channel frequency analyzer. The pulse rate was indicated by a cardiotachometer. The initial responses and CNV during the reception of paired auditory signals were similar to those seen with direct connection, provided that the subjects were engaged in some task related to the signals. The CNV was attenuated during exercise or conversation only while the subject was inattentive to the signals. The amplitude of the intracerebral responses to the conditional and imperative stimuli in the patients with implanted electrodes was reduced when the scalp CNV was attenuated by isolation or distraction. During the performance of fairly complex tasks following the auditory signals, the CNV terminated only at the completion of the task, not at the moment of muscular effort. The radio-control link was also used to instruct an experimenter when to toss a ball to a subject or to feint. In this situation also the CNV developed only when the subject was sure the ball was in the air and terminated when it was caught. These observations suggest that the interactions of evoked responses and CNV seen in laboratory conditions also accompany normal activity and the performance of everyday tasks.

A67-81991
GLUCONEOGENESIS DURING HIBERNATION AND AROUSAL FROM HIBERNATION.

Roy F. Burlington and George J. Klain (Fitzsimons Gen. Hosp., U.S. Army Med. Res. and Nutr. Lab., Physiol. Div., Denver, Colo.).

Comparative Biochemistry and Physiology, vol. 22, Sep. 1967, p 701–708. 2 refs.

In the ground squirrel, *Citellus tridecemlineatus*, liver glycogen and blood glucose decreased during hibernation. Two hr. after arousal, liver glycogen remained low but blood glucose was normal. When incubated at 6°C., kidney cortex slices from hibernating animals had a greater capacity for gluconeogenesis from α-ketoglutarate, L-glutamate, L-aspartate, glycerol, oxaloacetate, L-lactate and pyruvate than renal tissue from normothermic squirrels. At 40°C., glucose synthesis from L-aspartate, glycerol, L-lactate, oxaloacetate and pyruvate was significantly increased in renal tissue from hibernating and arousing animals. Hibernation and arousal were associated with significantly increased hepatic and renal lactic dehydrogenase and hepatic glutamic–oxaloacetic transminase activities but glucose-6-phosphatase and fructose-1,6-diphosphatase activities remained unchanged. The role of gluconeogenesis during hibernation and arousal is discussed.

A67-81992
MUSCLE POTENTIALS IN REACTION TIME.

Erich Luschei, Carol Saslow, and Mitchell Glickstein (Wash. U., Dept. of Physiol. and Biophys. and Reg. Primate Res. Center, Seattle).

Experimental Neurology, vol. 18, Aug. 1967, p. 429–442. 15 refs.
Grants PHS MH06722 and PHS FR00166.

Seven human and four monkey subjects performed a reaction time task at short latency following sound or light stimuli. Electromyographic (EMG) potentials were recorded in the responding limb during performance. The EMG latency was analyzed by study of individually recorded traces and by computer averaging. Two classes of EMG activity were observed. One class of potentials was strongly correlated with the response. In human subjects, response-correlated activation of biceps occurred 80 msec. following an auditory stimulus and 125 msec. following a light stimulus. Slightly longer latencies were recorded for response-correlated activity in monkeys. The second class of muscle potentials was unexpected. Early EMG activity was seen in responding muscles much before the response-correlated potentials and appeared to be more closely linked to the sensory stimuli than to the response. Such early potentials were seen at latencies as brief as 25 to 50 msec. following the stimulus in the arms of monkey subjects and were observed in extensor digitorum communis of one human subject when intramuscular recording electrodes were used.

A67-81993
THE SPINAL PATHWAY FOR SHIVERING.
George Clark and Garman H. Daron (Okla. U., Med. School, Oklahoma City).
Experimental Neurology, vol. 18, Aug. 1967, p. 453–458.
Grant NINDB NB-06140.

Using ablation technics, it was possible to localize the shivering pathway in the spinal cord of cats in the middle third of the medial portion of the lateral column. This pathway is near but not coextensive with the bladder pathway. Locomotion was possible with only the anterior column and ventral half of lateral columns or with the lateral half of a lateral column intact. In such preparation voiding and shivering below the lesion did not occur. In other animals, lesions were placed in the region of decussation of the rubrospinal and tectospinal pathways. Shivering, voiding, and locomotion were not affected.

A67-81994
MUSCLE SENSE IN MAN.
Samuel Gelfan and Sylvester Carter (N.Y. Med. Coll., New York City).
Experimental Neurology, vol. 18, Aug. 1967, p. 469–473. 19 refs.
Grant NIH NB-04417.

The problem of conscious proprioception, whether there is awareness of muscle length and tension changes, was investigated in volunteer patients whose muscle tendons available at the wrist and ankle were exposed under local anesthesia restricted to the skin. All subjects tested uniformly failed to detect length and tension changes when only the muscles were stretched. The signals from the tension and stretch receptors did not contribute to the kinesthetic sense when the joints of the fingers, hand or foot were also moved. None of the sensations experienced, including awareness of position and movement of joints, were referable to signals from muscle spindles or Golgi tendon organs. It was concluded that there is no muscle sense in man.

A67-81995
EFFECTS OF STIMULUS ROTATION ON DISCRIMINATION LEARNING BY MONKEYS.
Leslie H. Hicks (Howard U., Washington, D.C.).
Psychonomic Science, vol. 9, Sep. 5, 1967, p. 57–58.
Grant NIMH M-1215.

Monkey performance on object and pattern discriminations was compared under various stimulus rotational conditions: (1) positive and negative stimuli remain constant, (2) only positive stimulus rotates, (3) only negative stimulus rotates, (4) both stimuli rotate. Performance was best at the condition in which only the negative stimulus rotated.

A67-81996
THE EFFECT OF L-TRYPTOPHAN ON THE SLEEP-DREAM CYCLE IN MAN.
Ernest L. Hartmann (Tufts U., School of Med., Medford, Mass.).
Psychonomic Science, vol. 8, Aug. 15, 1967, p. 479–480. 11 refs.
Grants PHS MH-08715 and PHS K3-MH-8522.

The effect of l-tryptophan (120 mg./kg. at bedtime) on sleep was investigated on eight normal human subjects over 91 recorded laboratory nights. Subjectively, tryptophan was seen as a sleeping medication. Total sleep was not significantly increased. Total D-time was significantly increased, as was D-time percent for the second half of the night but not for the nights as a whole.

A67-81997
THE EFFECTS OF TARGET SPECIFICATION ON OBJECTS FIXATED DURING VISUAL SEARCH.
L. G. Williams (Honeywell, Inc., St. Paul, Minn.).
(Inst. for Perception RVO-TNO, Proc. of Symp., Driebergen, The Netherlands, Aug. 17–20, 1966).
Acta Psychologica, vol. 27, 1967, p. 355–360.
Contract NONR 4774(00).

When a person searches for a target in a cluttered visual field, his fixations typically fall on objects. Specifying the target characteristics will affect the probabilities of fixating different classes of objects. It was found that for fields containing objects differing widely in size, color, and shape, a high proportion of fixations were on objects of specified color, but only a moderate proportion were on objects of specified size or shape. When two or more target characteristics were specified fixations were generally based on a single characteristic. It was suggested that the specification of the target creates a perceptual structure which the subject explores. The study of visual fixations, in effect, is the study of that structure.

A67-81998
ROLES OF THYROXINE AND THYROCALCITONIN IN THE RESPONSE TO HYPERCALCEMIA IN RATS.
Ruben F. Gittes and George L. Irvin, III (NIH, Natl. Cancer Inst., Surg. Branch, Bethesda, Md.).
(Endocrine Soc., Ann. Meeting, New York, Jun. 19, 1965).
Endocrinology, vol. 79, Dec. 1966, p. 1033–1039. 24 refs.

Chronically parathyroidectomized rats counteracted the hypercalcemia induced by intraperitoneal injection of calcium more rapidly than thyroparathyroidectomized rats, whether the rats compared were thyroxine-treated or not. The results indicate that the thyroid alone, in the absence of all parathyroid secretions, effects a calcium-lowering response in hypercalcemia in the rat, presumably by the release of thyrocalcitonin, a polypeptide with demonstrated calcium-lowering activity. The thyroxine-dependent metabolic status of the animals also played a part in the rate of elimination of an exogenous hypercalcemia. The elimination was more rapid in thyroxine-treated than in saline-treated rats, whether normal thyroid tissue was present or not. Hence, evaluation of calcium tolerance after thyroidectomy requires consideration of the additive effects of lack of thyrocalcitonin and incipient classic hypothyroidism.

A67-81999
STIMULUS-REPETITION AND COLOR DISCRIMINATION.
Michael H. Siegel (Edgewood Arsenal Res. Labs., Md.).
American Journal of Psychology, vol. 80, Sep. 1967, p. 411–415. 8 refs.

The effect of the order of stimulus presentation on color discrimination was studied. Using trained subjects 50 stimuli (5 variables) were presented a total of ten times each in random order, or each stimulus-difference was shown two times in a row before a third randomly picked stimulus-difference was presented. Sensitivity measurements showed no apparent relation between the two experimental conditions, although there was great individual differences in the subjects. It was indicated that sensitivity is related to stimulus order and the number of times a stimulus was repeated.

A67-82000
FEEDBACK AND ACCURACY OF TARGET POSITIONING IN A HOMOGENEOUS VISUAL FIELD.

Milton S. Katz (U.S. Naval Training Device Center, Port Washington, N. Y.).
American Journal of Psychology, vol. 80, Sep. 1967, p. 405–410. 7 refs.

Three subjects were provided with feedback about error magnitude following each attempt to position a target at the geometric center of an empty visual field. Upon achievement of a criterional level of accuracy, feedback was discontinued, and accuracy of performance was compared with that of a control subject. Experimental feedback of results reduced constant error both during feedback and on subsequent retests without feedback. Variable error (standard deviation) was apparently responsive to practice, rather than to informational feedback, except that extremely accurate feedback seemed to produce a deleterious effect on performance.

A67-82001
BINAURAL SUMMATION IN LOUDNESS OF TWO TONES AS A FUNCTION OF THEIR BANDWIDTH.
R. D. Porsolt and R. J. Irwin (Auckland U., New Zealand).
American Journal of Psychology, vol. 80, Sep. 1967, p. 384–390. 17 refs.

The hypothesis was advanced that binaural summation of loudness is similar in origin to the increment in monaural loudness that results when the bandwidth of a stimulus of constant sound-pressure is increased beyond a critical value. Sixteen observers therefore adjusted the level of two tones heard monaurally to equal their loudness when one tone was presented to each ear. The adjustments were made with the two tones at various bandwidths. The results were qualitatively consistent with the hypothesis: as the bandwidth of the tones increased, binaural summation declined. Under some, but not all, conditions equal binaural and monaural loudness corresponded to equal binaural and monaural sound-pressures; the limited circumstances under which this equality would be expected to hold were discussed.

A67-82002
THE EFFECT OF STIMULUS FAMILIARIZATION PROCEDURE ON PAIRED-ASSOCIATE VERBAL LEARNING.
Wallace J. Orlowsky and John F. Walsh (Fordham U., New York City, N. Y.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 435–436. 11 refs.

Subjects were familiarized with stimulus words under either of two conditions: aimed at differentiating stimuli or creating associations to them. When the stimuli were used in a paired-associate task, subjects who attended to differentiating stimulus properties performed better than subjects who formed associations to the stimuli or subjects who had no pretraining. Subjects who formed associations did not differ in learning from subjects without pretraining.

A67-82003
COMPARATIVE PRONOUNCEABILITY RATINGS (P) OF 100 CVCS IN TWO COLLEGE POPULATIONS.
Clyde E. Noble (Ga. U., Athens).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 433–434.
Grant AFOSR 1099-66 and Contract Nonr-3677(02).

A sample of 100 consonant-vowel-consonant trigrams was presented to 200 subjects from widely-separated college populations at the Universities of Georgia and Montana in order to obtain comparative ratings of pronounceability (p). The results indicated high within-population reliability coefficients ($r \geq .98$) and a high between-population correlation coefficient ($r = .975$). When the ratings were grouped by fives into 20 pairs of means, the Montana norms regressed linearly on the Georgia norms with $r = .993$.

A67-82004
THE AIR OXIDATION OF MONOMETHYL HYDRAZINE.
E. H. Vernot, J. D. MacEwen, D. L. Geiger, and C. C. Haun (Aerojet-Gen. Corp., Overlook Branch, Dayton, Ohio).
American Industrial Hygiene Association Journal, vol. 28, Jul.–Aug. 1967, p. 343–347. 10 refs.
Contract AF 33(657)-11305

The air oxidation of monomethyl hydrazine was examined using gas chromatography and infrared spectrophotometry. Major products were found to be molecular nitrogen and methane. First order kinetics were obeyed and half-life calculated to be 34 min. under the conditions used. Evidence that the reaction was surface catalyzed was provided by the much faster rate shown when a polyethylene container was substituted for glass.

A67-82005
INTERVAL BETWEEN ITEM REPETITIONS AND FREE RECALL MEMORY.
Thomas K. Landauer (Stanford U., Calif.).
Psychonomic Science, vol. 8, Aug. 5, 1967, p. 439–440. 8 refs.

The interval between two presentations of the same item has a marked effect on paired associate learning but has been reported to have no effect on free recall. To explore this apparent contradiction, a free recall experiment was performed with a mixed list of words and nonsense syllables in which the interval between two presentations of the same item was varied. A significant spacing effect was obtained for nonsense syllables but none for words. It is suggested that spacing may be important only for new associative or response integrative learning.

A67-82006
CHANGES IN OLFACTORY AND GUSTATORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION.
W. Schutte and John P. Zubek (Manitoba U., Winnipeg, Canada).
Canadian Journal of Psychology, vol. 21, Aug. 1967, p. 337–345. 14 refs.
Grants NRC, Canada APT-106 and DRB, Canada 9425-08.

Subjects who were placed in darkness for a week but who otherwise were exposed to a normal and varied sensory environment showed a significant increase in olfactory sensitivity (benzene). The measures of gustatory thresholds yielded a differential pattern of results. Sensitivity of NaCl (salty) and sucrose (sweet) was increased significantly with the after-effects persisting for one day after restoration of normal visual stimulation. On the other hand, sensitivity of HCl (sour) and quinine (bitter) was not affected significantly. The results were interpreted as providing experimental support for a sensoristatic model recently formulated earlier by another investigator.

A67-82007
APPARENT MOTION OF A VISTA: AN ILLUSION OF PERSPECTIVE.
Harry J. Jerison (Antioch Coll., Yellow Springs, Ohio).
American Journal of Psychology, vol. 80, Sep. 1967, p. 448–453.
Contract AF F 33615-67-C-1280

The gradient of apparent distortion seen in figures contained within patterns of inclined lines, of which the Ponzo illusion is a special case, is described. An attempt is made to apply this principle to the differences in apparent size of the faces of the

Necker cube and to the changes in size evident upon reversal. It is suggested that the Ponzo illusion and the two alternative figural aspects of the Necker cube are similar. Application of the principle of the distortion-gradient to the Necker cube in each of its two aspects appears to yield a consistent explanation of its appearance.

A67-82008
EEG AND VIGILANCE BEHAVIOR.

Howard I. Thorsheim (Ill. U., Urbana).

Psychonomic Science, vol. 8, Aug. 15, 1967, p. 499–500. 8 refs.

An attempt was made to relate a physiological index of arousal and a behavioral index to test the arousal theory of vigilance. A visual monitoring task was used and the arousing activity was motor movements between signals. The motor manipulation was found to influence physiological arousal, but not the behavioral measure of monitoring efficiency.

A67-82009
NARCOTIC PROPERTIES OF CARBON DIOXIDE IN THE DOG.

John H. Eisele, Edmond I. Eger, II, and Musa Muallem (Calif. U., Med. Center, San Francisco).

Anesthesiology, vol. 28, Sep. Oct. 1967, p. 856–865. 29 refs.
Grants PHS HE 07946-03, PHS GM-K3-17, 685, PHS 5 ROI HE 07946, and PHS 2 TOI GM 00063.

Arterial carbon dioxide tension (Pa_{CO_2}) ranging from 15 mm. to 95 mm. of mercury with arterial pH values from 7.64 to 7.10 had no effect on the minimum anesthetic concentration (MAC) for halothane in dogs. Pa_{CO_2} levels above 95 mm. of mercury with arterial pH below 7.10 were progressively narcotic, and replaced the halothane required to maintain a constant depth of anesthesia. Anesthesia was achieved with CO_2 alone at Pa_{CO_2} of 245 mm. of mercury. The mechanism of CO_2 narcosis correlated well ($P > 0.05$) with the pH changes in the brain as measured in the cisternal CSF, and appeared to be independent of arterial pH, Pa_{CO_2}, and cerebrospinal fluid P_{CO_2}.

A67-82010
A LIVING ORGANISM OF UNUSUAL ISOTOPIC COMPOSITION. SEQUENTIAL AND CUMULATIVE REPLACEMENT OF STABLE ISOTOPES IN CHLORELLA VULGARIS.

R. A. Uphaus, E. Flaumenhaft, and J. J. Katz (Argonne Natl. Lab., Chem. Div., Ill.).

Biochimica et Biophysica Acta, vol. 141, Aug. 29, 1967, p. 625–632. 13 refs.

Replacement of the biologically important isotopes by the corresponding heavier stable isotopes results in marked cytological changes in the alga *Chlorella vulgaris*. The isotopes used were those of hydrogen, carbon, oxygen and nitrogen. Progressive isotopic substitution results in increasingly greater deviations from normal cell size, the more highly substituted cells being much larger than ordinary cells. Isotopic substitution also changes the quantity and distribution of such cellular components as nucleic acids, carbohydrates and proteins, as evidenced by staining techniques.

A67-82011
RECOVERY OF RETINAL FUNCTION FROM SUPPRESSION CAUSED BY FLASHES OF LIGHT.

Valter Elenius (Turku U., Dept. of Ophthalmol., Finland).

Archives of Ophthalmology, vol. 78, Sep. 1967, p. 297–299.
Sigrid Juselius Stiftelse supported research.

When the dark-adapted, totally color-blind eye is stimulated with pairs of single flahses of light of 0.15 mL. luminance and of ten msec. duration the difference in size of the two electroretinograms (ERG) evoked, as related to the dark interval between the stimuli, indicates exponential decay of suppression caused by the first stimulus. In these conditions the main component of the ERG is the "scotopic" b-wave. Using pairs of light flashes of much higher luminance (150 mL., 20,000 photopic troland, ten msec. duration) for stimulation, the recovery of retinal function from suppression caused by the first stimulus is not only delayed by several hundred milliseconds, but also the time constant of the process is longer. In these conditions the ERG consists of both a negative and a positive component.

A67-82012
THE EFFECT OF PROGRESSIVE HYPOXIA ON THE RESPIRATORY AND CARDIOVASCULAR SYSTEMS OF THE CHICKEN.

P. J. Butler (East Anglia U., School of Biol. Sci., Norwich, Great Britain).

Journal of Physiology, vol. 191, Jul. 1967, p. 309–324. 25 refs.
Sci. Res. Council supported research.

During the initial stages of progressive hypoxia the intact, unanesthetized chicken shows increases in heart rate and respiratory frequency with no change in arterial blood pressure and oxygen consumption. During the later stages, heart rate, diastolic and mean blood pressure and oxygen consumption fall, while respiratory frequency increases further. Following bilateral cervical vagotomy and adrenergic β-receptor blockage there is no tachycardia, but the late bradycardia and fall in blood pressure do occur during progressive hypoxia. Respiratory frequency remains at a low level after vagotomy. It is suggested that the initial tachycardia is dependent on both the sympathetic and parasympathetic nervous systems, and that the former helps maintain arterial pressure during the early stages of hypoxia. Bradycardia and hypotension seem to be due to anoxia itself, and the vagus is essential for the increase in respiratory frequency.

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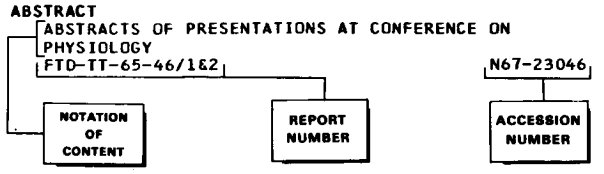

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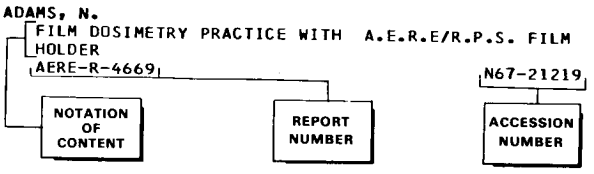

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